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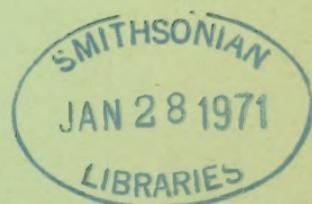
Vol. 3 Part 1

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THE COLEOPTERA OF THE BAILIWICK OF GUERNSEY

Additions and corrections to the List. (*Proc. S. Lond. Ent. Nat. Hist. Soc.* 1966:101-5)

By HORACE R. LAST

On 15th May 1968, by kind permission of Mr. L. J. Matchan, I visited the island of Brechou and spent four or five hours collecting beetles. The island is just off the west of Sark and is 1200 yards long by 250 yards wide. The day was sunless and collecting was not easy.

As far as records can be traced, only two species have been recorded from Brechou, by Mr. Hirst in 1902, and these were included in my previous list.

The following list comprises all of these records, except the two referred to above and also a few additional records from Guernsey and adjoining islands where they have contributed to the further completion of the list. The majority of these have been furnished by Dr. R. LePelley (of Guernsey) to whom I wish to express my grateful thanks; other records have been sent to me by Mr. R. T. Thompson who has very kindly identified the weevils and the *Olibrus* genus; Mr. A. E. Gardner has also identified a large number of specimens and I wish to record my appreciation of their help in the compiling of this further list. Mr. Thompson has also supplied useful information and Mr. Shayer (Société Guernesiaise) was also once again very helpful. Mr. Thompson has also pointed out that *Anthrenus sarnicus* Mroc., should now be included in the main list as it has been recorded in the London area and on Salisbury Plain (1967). Another new species to the list is *Necrobia rufipes* (Deg.). On 14th July 1968, the Liberian ship *President Garcia* ran aground in Saints Bay. The vessel carried a cargo of copra which was infested with *N. rufipes* and a large number of beetles came ashore and caused much concern as a possible tomato pest but they soon disappeared; whether or not they are breeding in Guernsey is not yet known.

The increased numbers of species for the individual islands are now, Guernsey 626, Alderney 168, Sark 137, Jethou 28, Brechou 40; ten old records by Luff have been confirmed and 12 new species added, and allowing for one deletion, the grand total for the Bailiwick now stands at 1,111 species. Where a species is new to any particular island the record is followed by the first letter of the name of the island as in the original list, those with an asterisk are new additions entirely.

LIST OF SPECIES

- | | |
|---|---|
| <i>Nebria brevicollis</i> (F.), B (Last) | <i>Abax parallelepipedus</i> Pill. & Mit., B (Last) |
| <i>Notiophilus quadripunctatus</i> Dej., B (Last) | <i>Odontonyx rotundatus</i> (Payk.), B (Le-Pelley) |
| <i>Bembidion harpaloides</i> Serv., B (LePelley) | <i>Metabletus foveatus</i> (Fourc.), B (Last) |
| * <i>Badister unipustulatus</i> Bon., B (Last) | <i>Oxytelus rugosus</i> (F.), B (Last) |
| <i>Harpalus tardus</i> (Panz.), B (Last) | <i>Astenus procerus</i> (Grav.), B (Last) |
| <i>anxius</i> (Duft.), B (Last) | <i>Rugilus rufipes</i> Germ., B (Last) |
| <i>affinis</i> (Schrank) | <i>Quedius semiobscurus</i> (Marsh.), B (Last) |
| (<i>aeneus</i> (F.)), B (Last) | <i>Habrocerus capillaricornis</i> (Grav.), B (Last) |
| * <i>Bradycellus harpalinus</i> (Serv.), G. (Le-Pelley) | <i>Conosomus testaceus</i> (F.), B (Last.) |
| <i>Amara communis</i> (Panz.), v. <i>convexior</i> Steph., B (Last) | <i>Tachyporus formosus</i> Matth., B (Last) |
| <i>Pterostichus madidus</i> (F.), B (Last) | <i>solutus</i> Er., B (Last) |

- **Atheta (Acrotona) fungi* (Grav.), S (Side)
B (Last)
- Drusilla canaliculata* (F.), B (Last)
- Aleochara (Homoeochara) sparsa* Heer.,
S (Side)
- Saprinus semistriatus* (Scriba), G (Le-
Pelley)
- Pachylopus maritimus* (Steph.), G
(LePelley)
- Rhagonycha fulva* (Scop.), G (LePelley)
- **Necrobia rufipes* (Deg.), G. (LePelley)
- Adelocera murina* (L.), B (Last)
- Cardiophorus erichsoni* Buys., B (Last)
- Athous haemorrhoidalis* (F.), B (Last)
- Agriotes pallidulus* (Ill.), G (LePelley) B
(Last)
- Brachypterus glaber* (Steph.), B (Last)
- Meligethes erythropus* (Gyll.), B (Last)
- **Corticaria elongata* (Gyll.), G (LePelley)
- **Stilbus testaceus* (Panz.), G (LePelley)
- Rhyzobius litura* (F.), B (Last)
- **Adalia decempunctata* L. G (LePelley)
- Coccinella undecimpunctata* (L.), G
(LePelley)
- Anthicus floralis* (L.), B (Last)
- Cylindronotus laevioctostriatus* (Goeze),
B (Last)
- Typhaeus typhoeus* (L.), B (Last)
- Geotrupes pyrenaeus* Charp., J (R. Long)
vernalis (L.), B (Last)
- Aphodius nitidulus* (F.), G (LePelley)
rufipes (L.), G (LePelley)
- **Cryptocephalus fulvus* Goeze, G
(LePelley)
- Chrysolina banksi* (F.), G. (LePelley)
- **Phaedon cochlearia* (F.), G (LePelley)
regnianum Tott. G (LePelley)
- **Longitarsus succineus* Fond., B
(LePelley)
- gracilis* Kuts., G (LePelley)
rubiginosus (Foud.), B (LePelley)
- Sphaeroderma testaceum* (F.), G
(LePelley)
- Psylloides napi* (F.), G (LePelley)
- Apion curtirostre* Germ., A (Thompson)
rufirostre (F.), A (LePelley)
- **radiolus* Kirby, A (LePelley)
- aeneum* (F.), A (Thompson)
- pomonae* (F.), G (LePelley)
- Otiorrhynchus sulcatus* (F.), B (Last)
- Trachyphloeus bifoveolatus* (Beck), B
(Last)
- Sitona lepidus* Gyll., G (Last)
- Caulotrupis aeneopiceus* (Boh.), B (Last)

Additional species so far not recorded from the U.K. or from any other Channel Island:

Atemelea pubicollis Bris. G. Petit Bot 5.ix.24 (W. E. China).

This specimen is in the General Collection of the British Museum (Nat. Hist.). In Junk it is recorded from mid Europe and Spain but according to Winkler, it is not common.

12 Winkworth Road,
Banstead,
Surrey.
3rd January 1970.

NOTES AND OBSERVATIONS ON SCOTTISH PTINIDS WITH PARTICULAR REFERENCE TO THE SOUTH-EAST REGION

By BRIAN MORRISON

*D.A.F.S. Freshwater Fisheries Laboratory,
Pitlochry, Perthshire*

The earliest record I have of ptinids in Scotland is the mention of *Ptinus fur* L. in Stewart's *List of Insects found in the Neighbourhood of Edinburgh*, a paper read to members of the Wernerian Society in 1909. It was in lists such as this and in occasional notes in natural history periodicals that most of the native and introduced ptinids first became known to the entomological public during the nineteenth and early twentieth century. Many of the records are from dwelling houses, and this, in addition to the close resemblance the ptinids bear to the wood-eating anobiids, has no doubt been responsible for the assumption that the former also have wood-eating habits. For example, in Burmeister's *Manual of Entomology* (1836) we read '... others devour and bore into the hard stem; to those belong the Ptini, Anobia, and in general the entire family of Deperditora, the Cerambycina, and the bark beetles *Hylesinus*, *Bostrichus*, *Apate*, etc.'. That there is some foundation for this statement is clear from remarks made by later investigators. Picard (1919), writing of *Ptinus lichenum* Marsham says that this species 'perfore l'écorce et le bois sec à la façon des *Anobium*'; and Shapiro (1948) states that occasionally larvae of most pest forms bore in sound timber but it is unlikely that they are feeding.

It seems probable that both the Anobiidae and the Ptinidae arose from the same evolutionary stock and that the ptinids gradually moved away from the wood-eating habit with the result that today the majority of species of this family feed on animal and plant remains and only a few such as *Ptinus palliatus* Perris and *P. lichenum* retain their former close association with a woody environment, although even in the case of these insects the wood is usually of a decayed nature. The basic difference in larval eating habits between the anobiid and ptinid beetles was recognized by Stephens and his contemporaries who, although including both groups within the one family, Ptinidae, were careful to separate them on morphological grounds and by the fact that the known *Ptinus* larvae were found on dried animal and vegetable matter rather than in wood.

In 1834, some time after the publication of Stewart's list, the first volume of a work entitled *Entomologia Edinensis* appeared, in which descriptions of all the known species of beetle found in the Edinburgh area were given. These included four ptinids and the authors made the following comments:

Ptinus sexpunctatus Panz. Found in old woods, in houses, etc.

Ptinus fur L. Not infrequent in old wood in houses.

Ptinus crenatus F. (= *Tipnus unicolor* Piller & Mitterpacher)

In such places as the two preceding species, occurring occasionally about Edinburgh and in other parts of Scotland.

Ptinus lichenum Marsham (mentioned simply as occurring in the Raehills area).

The association with wood will be noted.

In 1853, Andrew Murray of Conland, a lawyer, published his *Catalogue of the Coleoptera of Scotland* in which he quotes from the last-mentioned work but adds three further species to the Scottish list. By this time, the genus *Anobium* had finally been separated from *Ptinus* and related genera and had been placed in the newly-created family Anobiidae. Murray's new species were:

- Ptinus hololeucus* Fald. (= *Niptus hololeucus*) Plentiful in houses in Edinburgh.
Gibbium scotias F. (= *G. psylloides* de Czempinski) Arlary in Kinross-shire among a parcel of dried plants from India.
Mezium sulcatum F. (probably = *M. affine* Boield.) Edinburgh, among a consignment of decapods from Australia.

Of the others, he again quotes *P. sexpunctatus* as being found on old wood in houses, and remarks that *P. crenatus* (= *T. unicolor*) is 'the commonest of the species'.

Between the time the catalogue made its appearance and the late 1930s, there are many reports of the occurrence of new species, probably all introduced, as well as of those already known. *Ptinus tectus* Boield, *Trigonogenius globulus* Solier, and *Ptinus pusillus* Sturm were first recorded in Britain about the turn of the century, while *Pseudeurostus hilleri* Reitter was said to be widespread in Scottish grain stores in 1938. It was the arrival of these immigrant ptinids and their frequent presence on stored food products (by which means they were undoubtedly introduced) which led to a number of studies being made into their life history and food requirements, notably by Howe and his colleagues at the Pest Infestation Laboratory at Slough. These studies confirmed that the natural food of most ptinids was probably animal or plant refuse but they also provided a possible clue to the reason for the association of ptinids with 'wood in old houses'. Howe noted that if the relative humidity of the ptinid environment fell below 40 per cent, the beetles did not breed. This information is supported by the common experience of those who keep these insects, that the cultures do very much better if a supply of moisture is provided in the container. Now, since dampness in walls and on wood is a feature of old houses which are often inadequately heated, it is quite feasible that such conditions serve to attract ptinids which then become much more obvious to the inhabitants. In conversations with staff of Edinburgh Corporation's Health Department I learned that both *P. tectus* and *N. hololeucus* are particularly in evidence in houses with leaking roofs, and even in perfectly sound buildings both species are often found in baths and wash-basins. I have found *T. globulus* and *T. unicolor* in the same situations. That this is not the complete answer is indicated by the fact that even in the most modern multi-storey flats ptinids can be found on carpets and in corners. Here the attraction may be food particles, although ptinids are known to occur in places where diligent searching has failed to reveal any obvious food material so that it is likely that some other factor may be involved.

The ptinids which have become stored products pests are mostly species which have been introduced into this country within the last hundred years or so, and in the south-east of Scotland six species are found fairly regularly wherever food material is manufactured or stored. The information given in the table below is derived partly from reports on premises made over a period of 20 years up to 1966 and partly from my own observations during the five and a half years I spent with the Department of Agriculture and Fisheries for Scotland as a food infestation inspector in that region. It should be mentioned that, from an economic point of view, ptinids are regarded more as a nuisance than as serious pests, since beetles are rarely found in any quantity on food which has been in store for short periods and is in good condition. Consequently, during inspections, they tend to be noted in passing rather than specifically looked for; and because of this, the information which has been recorded may not be as complete as would have been the case had the beetles in question regularly caused serious damage.

One other factor which complicates the issue is the question of identification.

Not only do the males and females of any one given species sometimes differ in size, shape, and colour, but several species are very similar to one another. Probably the best illustration of the kind of difficulty which can arise is the recent discovery that *Ptinus latro* F. is, in fact, a triploid form of *Ptinus clavipes* Panzer (= *P. hirtellus* Sturm). Fortunately, the species dealt with in this paper are fairly easily identifiable, even to the non-specialist. The possible exception is *P. fur* which, on occasion, may have been confused with some closely-related insects.

TABLE SHOWING THE NUMBER OF DIFFERENT KINDS OF PREMISES FROM WHICH THE VARIOUS SPECIES OF PTINIDS HAVE BEEN RECORDED

Type of premises	Total inspected	<i>P. tectus</i>	<i>N. hololeucus</i>	<i>T. globulus</i>	<i>T. unicolor</i>	<i>P. fur</i>	<i>P. hilleri</i>
Farms	182	55	9	5	26	24	—
Provender Mills	16	16	14	9	8	7	6
Provender Stores	16	12	7	4	2	2	—
Warehouses	28	27	19	18	11	13	8
Maltings	28	27	27	21	8	6	8
Bakeries	9	5	4	—	—	—	—
Flour Mills	6	6	5	4	3	1	2
Oatmeal Mills	3	3	3	1	—	1	—

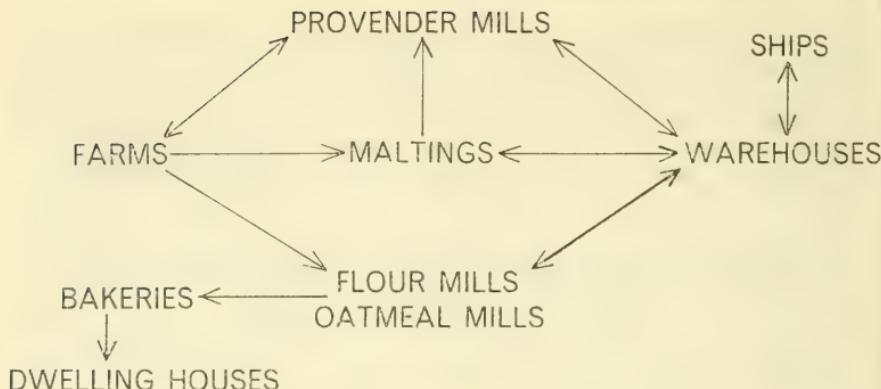
Of the six species listed, two, namely *P. fur* and *T. unicolor* might be considered as native to this country since both have been recorded as common as far back as the early nineteenth century. The others have without doubt been introduced since then. Consequently, it is interesting to note how widely distributed they have become. The table gives some idea of the number and range of types of premises from which ptinids have been collected in south-east Scotland. From discussions I have had with inspectors in other areas, it seems that similar results would be obtained in surveys made elsewhere.

To understand how such a wide distribution could be effected in such a relatively short time, it is necessary to investigate the means by which distribution might be carried out and also the conditions in the new environment which enable these insects to breed successfully.

As has been stated already, most of the ptinids undoubtedly reached us on imported food, and even today inspectors occasionally discover fresh infestations on newly-arrived cargoes from different parts of the world. These cargoes are normally discharged into a dock shed or warehouse to await distribution to other premises. It is the complex interlinking of distribution centres with final destinations that provides the means by which insects of all kinds are carried to the remotest corners of the land. The diagram overleaf illustrates some of the relationships involved.

In several cases there is two-way traffic and this ensures a thorough mixing of insect populations.

Once the insects have been introduced into their new environment, man unwittingly helps them to become firmly established. One of the most interesting



features of our insect fauna is the presence of several sub-tropical species which seem to have become very successful in many of the coldest areas of the country, to such an extent, in fact, that they are now of major economic importance. *Trogoderma granaria* Everts and *Oryzaephilus surinamensis* L. are examples. This comes about because stored products insects are more often affected by micro-climates inside food masses rather than by weather conditions outside a building, and since so much of the processing of food materials involves high temperature, insects have been able to establish themselves simply by living in or near processing machinery. Beetles which originated in more temperate climates, such as *P. tectus* (possibly a Tasmanian species) may be able to complete their life-cycle in a much shorter time and this results in an increase in the growth-rate of the population.

Having discussed briefly the factors involved in distribution, I would like now to consider the frequency of occurrence of each of the six species in different kinds of premises. Referring again to the table, it will be noted that the beetles can be divided roughly into two groups according to the overall frequency of occurrence in all types of premises. The first group consists of *P. tectus*, *N. hololeucus*, and *T. globulus*. The last-named insect is the most uncommon of the three, but was found in larger numbers and slightly more often than any of the second group: *T. unicolor*, *P. fur*, and *P. hilleri*. Undoubtedly *P. tectus* is the commonest of all the ptinids represented and this may be partly due to the fact that it can pass through its life-cycle twice in one year. Apart from the farms, it was recorded from almost all the premises visited, and its presence was often first made known by the sight of a large number of small hemispherical cocoons on a bag of meal or flour which had lain in store for several months or even years. Further investigation would usually reveal the white grubs and the dull brown adults.

The attraction of finely divided food material such as meal may again reflect the importance of moisture to the ptinids. Since a given volume of such material will have a greater surface area than the same volume in a solid mass, the former provides a greater area on to which water molecules might be adsorbed. In conditions of high humidity such as one gets in a provender mill this might be an important environmental factor. This theory would also account for the appearance of ptinids in such substances as salt and sodium bicarbonate which, by themselves, can have little food value, but which readily absorb moisture from the air.

Niptus hololeucus has been described as locally common, and while I have not come across it so frequently as *P. tectus*, it nevertheless has been collected from almost as wide a range of premises as that insect. I have often seen it in large numbers in maltings or premises where malt culms and other malt residues were stored. A curious feature of such populations is the apparent scarcity of larvae. Other entomologists with whom I have spoken have also commented on this.

The last member of the first group, *T. globulus*, is another insect sometimes found in large numbers where it occurs. Specimens vary greatly in colour from a light grey with darker markings, through shades of brown to almost wholly black or very dark grey. This species is less common than the two preceding, but has similar habits.

All the beetles of the first group were often found in aggregations, occasionally of several dozen insects, and this behavioural character stands in marked contrast to the situation found among beetles of the second group. These were in most cases discovered as single specimens, although *P. hilleri* would sometimes be found in groups of four or six, rarely more. Whether this means that species of the second group have been overlooked in some premises or that they are indeed less common, is difficult to say, but if the latter is true, it may be that they are being ousted by the more successful introduced insects.

In my own experience both *P. fur* and *T. unicolor* were to be found more often on dusty walls and floors than on bags of stored food material, and in farms, empty grain bins would usually contain one or two individuals of *P. fur* walking slowly up the side walls while *T. unicolor* could be collected from the walls and ceiling of the grain tunnel which houses the conveyor that transports the grain from the bins to the drier. *Pseudeurostus hilleri*, on the other hand, has not been recorded from the farms whose reports I have studied, and this in itself is something of a mystery, for a D.S.I.R. report published in 1941 specifically states that this species was 'widespread in Scottish grain stores', the information being based on a survey undertaken in 1938-9. I can offer no explanation for this.

P. fur, *T. unicolor*, and *P. hilleri* could perhaps best be described as occurring fairly regularly in small numbers but not very common. In view of the fact that the first two species can be regarded as native to this country and that *T. unicolor* was once described as 'the commonest of the species' (i.e. the commonest ptinid then known—1853), a field study of the habits and food requirements of both native and immigrant ptinids might well give some interesting information on competition between them. Much has been done in the laboratory, but I believe if we are to understand the changes which have taken place in our ptinid populations over the past hundred years, this must be supported by a thorough field investigation. Such an investigation might be of more academic than practical value, but on the other hand it might give us deeper insight into the complex problems which arise when introduced animals of any group become established in a new environment and start to spread.

Finally, I should like to make a brief note of some other species of ptinid which have also been recorded in Scotland. *Ptinus pusillus* has been seen occasionally in widely separated districts, but would appear to be much less common than it is in England. *Ptinus exulans* was found on a consignment of Australian oats in Leith in 1949 and *Ptinus villiger* has been taken on cargoes from Canada. *Gibbium psylloides* was discovered in three premises in Leith between 1946 and 1957 and has also been recorded in the Glasgow area, as has *Mezium affine*.

ACKNOWLEDGEMENTS

Apart from the reports on premises contained in the files of the Infestation Branch of the Department of Agriculture and Fisheries for Scotland, much of the information for this paper was obtained by looking up records in books and periodicals dating back to the early years of the last century and I am grateful to Mr. E. C. Pelham-Clinton of the Royal Scottish Museum, Edinburgh, for his help in this and other matters. I should like to thank also, members of the staff of Edinburgh Corporation's Health Department for information on the occurrence of ptinids in dwelling houses, and my former colleagues in the Infestation Branch for giving me the benefit of their experience of store products pests.

REFERENCES

- Stewart, C., 1909, List of Insects found in the neighbourhood of Edinburgh, *Memoirs of the Wernerian Society* 1 p. 566.
 Stephens, J. F., 1827-1835, *Illustrations of British Entomology (Mandibulata)*, vol. 3, p. 229.
 Wilson, J. and Duncan, J., 1834, *Entomologia Edinensis* 1:215-17, Blackwood, Edinburgh.
 Shuckard, W. E., 1836, *A Manual of Entomology* (translated from the German of Dr. Hermann Burmeister), E. Churton, London, p. 355.
 Murray, A., 1853, *Catalogue of the Coleoptera of Scotland*, p. 58-9, Blackwood and Son, Edinburgh.
 Pickard, F., 1919, La faune entomologique du figuier, *Ann. Serv. Epiphyt.* 6:34-174.
 Shapiro, L. D., 1948, Ptinids & Dermestids destructive to wood, *Ent. Obozr.*, 30: 53-59.
 Howe, R. W., 1959, Studies on beetles of the Family Ptinidae XVII, *Bull. Ent. Res.* 50 (2).
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JOINT COMMITTEE FOR THE CONSERVATION OF BRITISH INSECTS

The Royal Entomological Society called a meeting on 21st June 1968 to set up an independent, broadly based committee for the conservation of insects, following the dissolution of both its own Conservation (Insect Protection) Committee and the Entomological Liaison Committee of the Nature Conservancy. At its first meeting, on 1st November 1968, the scope and representation of the new committee was widened so that it now consists of representatives of the Royal Entomological Society, British Trust for Entomology, British Entomological and Natural History Society, Amateur Entomologists' Society, British Butterfly Conservation Society, a representative of the Keeper of Entomology, British Museum (Nat. Hist.), and regional representatives. The Forestry Commission send an observer, and the Nature Conservancy and Society for the Promotion of Nature Reserves are also represented. Mr. N. D. Riley, C.B.E., has accepted the chairmanship of the Committee.

The Committee's terms of reference are:

1. To prepare a register of species requiring conservation and to investigate their status.
2. To consider what form of conservation (if any) would be the most suitable in any given case.

3. To act as a forum for the consideration of any matters relevant to items 1 and 2 above.
4. To initiate and promote any action that appears necessary for the purpose of securing the conservation of threatened species or habitats, including the promotion of legislation.
5. To act in liaison with the Nature Conservancy, the Conservation Committee of the Society for the Promotion of Nature Reserves and other appropriate bodies in all matters concerning the conservation of British insects and their habitats.

Populations of insects are threatened by many factors in our modern, industrialized society. These threats may be summarized as:

1. *Destruction of habitat.* This is an important factor which is under the control of man. It has been estimated that between 1951 and 1971 750,000 acres of agricultural land will have been taken for building in England and Wales.

2. *Changes in land use.* Forestry, when it concentrates on the production of conifers, is particularly harmful to insect populations, and so are many aspects of agricultural improvement, such as the destruction of hedgerows, ploughing-up of old pasture and the draining of fens and marshes. Neglect or abandonment of former management practices, such as the coppicing of woodland and grazing of chalk grassland has an adverse effect on populations of some species. Public pressure on the countryside for recreation also affects populations of insects, and this is likely to increase considerably in the future.

It is particularly important to manage wisely for the conservation of insects and other forms of wild life those areas of countryside which have not been changed greatly, so that they can be properly enjoyed by all.

3. *Toxic chemicals and pollution.* Pesticides (including herbicides) undoubtedly affect many insects adversely. The threats to wild life posed by the use of pesticides are sufficiently serious for a government committee to be considering the restriction of use of certain especially persistent substances which can contaminate the environment well away from the point of application.

The chemical pollution and heating of rivers, streams, lakes and ponds frequently kill aquatic insects on a large scale. Atmospheric pollution from industrial sources may destroy the food or habitat of insect species unable to adapt quickly to change.

It is the task of the new Joint Committee to advise and co-operate with the conservation movement as a whole in finding solutions to these problems. Particular attention will be given to species of national rarity and those in special need of conservation.

The problem of overcollecting is also one which causes the Committee serious concern. Entomologists of all lands are being brought into disrepute by the actions of a number of collectors, mainly lepidopterists, who are plundering rare and local insects without regard to the need to conserve our insect fauna. Both Trusts for Nature Conservation and members of natural history societies who wish to protect colonies of rare and local species have expressed their disapproval of such activities in strong terms. Certain species inhabiting well-known areas, which attract both local entomologists and those from other regions, either on holiday or on a special trip, are subject to a disproportionate amount of collecting which cannot be tolerated if the colonies are to survive. There is little doubt that if the activities of these entomologists continue in this way the goodwill of the County Trusts for Nature Conservation, other organizations in the countryside, and those interested in other branches of natural history, will be alienated, and

such goodwill as at present exists will not be extended to entomologists in general.

The committee urges all entomologists, of whatever depth of interest, to:

- (a) give serious thought to their collecting requirements and the need to conserve our more local species,
- (b) encourage fellow entomologists to do likewise,
- (c) and, in the case of butterflies, to pursue their interests, in all stages of the insects, with the aid of photography whenever possible.

All entomologists are invited to bring matters of conservation interest to the attention of the Committee.

For further information contact: Dr. M. G. Morris (Hon. Sec. Joint Committee for the Conservation of British Insects), 41 Queen's Gate, South Kensington, London, S.W.7.

THE CONSERVATION OF BLACK AND BROWN HAIRSTREAKS

By J. A. THOMAS

The Black Hairstreak (*Strymonidia pruni* L.) and the Brown Hairstreak (*Thecla betulae* L.) are both very local woodland butterflies, although their foodplant, blackthorn, is widespread and common. *S. pruni* is known only in a few Midlands woods whilst *T. betulae* is found very locally over a large area of the southern half of Britain and Ireland.

The widespread destruction of woodland habitats throughout Great Britain threatens both species with extinction, and their most hopeful prospect of survival in our fauna is probably on Nature Reserves. There are three supporting *S. pruni* already and several with *T. betulae*. Most reserves require careful management to maintain suitable conditions for such species of special interest on them, and many of us are concerned at our lack of knowledge about the factors regulating the distribution and numbers of these butterflies. Once this problem has been solved it should be possible to maintain some sites under optimum conditions to ensure the survival of large and healthy populations of *S. pruni* and *T. betulae* on a few Reserves although they are disappearing from many former localities. To this end I have been awarded a three year National Environment Research Council grant to investigate the problem at Monks Wood Experimental Station.

Blackie briefly examined the case of *S. pruni* in 1952. He considered its range to be delimited by the need for ancient forests on boulder clay of altitude below 400 ft. These must contain large quantities of blackthorn, have an annual rainfall of around 26 to 30 inches, and an average mean temperature of about 48°F. My preliminary investigations largely concur with his conclusions, although any clays, not necessarily boulder clay, will suffice. In addition cold dry winters and warm sunny summers seem more important than the average annual temperature, and the blackthorn must be mature and relatively sheltered from gales. The range of *T. betulae* suggests the need for a long warm summer for its lengthy period of growth and maturation. As yet there is insufficient data to explain why both insects are so scarce and restricted within their overall ranges; *S. pruni*, for example, occurs only in limited areas within the few woods it inhabits.

The success of this research project requires the help of fellow entomologists, and already many have been extremely co-operative. I would greatly appreciate it if entomologists familiar with either insect in Great Britain or abroad, would contact me. Not only is it important to establish where the butterflies occur and

where they do not, but also to discover any fluctuations in their status over the years, and all aspects of their Natural History that have been recorded. Disclosures of new localities would be treated with strict confidence should that be requested. In addition experiments to test theories require specimens of all stages of both insects, and should anyone have live British specimens of either species, I would be extremely grateful to receive any surplus stock he could spare.

Finally, this programme requires the intensive study of populations of both species in Monks Wood Reserve, which includes population counts using marked individuals. Such studies need completely undisturbed colonies and the collecting of *S. pruni* and *T. betulae* is not being permitted in this wood over this period. It is hoped that disappointed collectors will appreciate the need for such an action until more is known about both species, and until a conservation programme is planned ensuring large populations of both butterflies in the Reserves they inhabit.

REFERENCES

Blackie, J. E. H., 1952, *Entomologist*, 85:93-4.

Monks Wood Experimental Station,
Abbots Ripton, Hunts.
30th October 1969.

OBITUARY

R. A. JACKSON

The news of the death of Captain R. A. Jackson, R.N. on September 16th 1969 came as a shock to many members of this Society.

To the writer it came as a great shock as he first met Rex on December 5th 1901 and had kept in close touch with him over the years.

To say he was a keen lepidopterist is to put it mildly for I know full well from our schooldays together how indefatigable he was, especially during the collecting season.

It is true that on passing into the Navy with flying colours in 1902, he had not quite the opportunities that came to him in his retirement, but when he did retire after a period at the Admiralty he energetically made up for lost time.

This I suffered on his many visits to this part of Kent, for after a somewhat tiring day in the Warren at Folkestone or Dungeness I would find myself being whisked off to Hamstreet Woods for a late night sitting. It was however always an experience and there was usually some comic interlude during the day.

His old straw boater, surely a relic of his schooldays, and his monocle always caused comic incidents—too many to mention—to those who had the great experience of a day's collecting with him.

On being posted to the Admiralty during the second war in 1939 he immediately joined the Society and became a very active member. He was honoured with the Presidency in 1945 and was re-elected in 1946.

During these years he was always most assiduous in his activities for the good name of the South London, as it then was, and he steered it through the somewhat difficult period of change of habitat. He never missed an exhibition and always had an exhibit of interest.

He was also a member of the Royal Entomological Society and served on the Council for a time as well as having a long period with the Protection Committee.

On retiring from the Admiralty he was awarded the C.B.E. and became domiciled at Codford St. Mary where he held open house to all collectors.

There was another side, and perhaps to those who knew him only as an entomologist it may come as a surprise, that he was a bit of an athlete, for he played hockey for the Navy and also for his County, Hampshire.

Though very keen on cricket he was perhaps never a great performer but he excelled at croquet and played in many tournaments.

Yet another of the Old School has passed away and by many he will be sadly missed.

We offer our sympathies to his son, daughter-in-law and grandson.

C. A. W. DUFFIELD.

A SUPPLEMENTARY NOTE ON NORELLIA R.-D. (DIPT., SCATOPHAGIDAE)

By P. J. CHANDLER

In a recent paper (1969, *Proc. Brit. ent. nat. Hist. Soc.* 2 (4):120-4) recording the occurrence of a species of *Norellia* as new to Britain, it was stated that we were awaiting the results of Mr. J. R. Vockeroth's enquiries concerning the type specimens of *Cordilura spinipes* Meigen before we could confidently assign a name to the flies taken by us. We have now been informed by Mr. Vockeroth that an examination of the male and female of *spinipes* in Meigen's collection by L. Matile of the Paris Museum has established that they belong to the same species as our British specimens. Thus *Norellia spinipes* (Mg.) is the correct name for the British fly. There is no reasonable doubt that *pseudonarcissi* Desvoidy is a synonym of *spinipes*, unless *N. tipularia* F. occurred as far north as Paris, the probable type locality. *N. pseudonarcissi* is the type species of the genus and this status is now therefore best given to *spinipes*.

Mr. Vockeroth considers that the recent introduction of *N. spinipes* into Britain is unlikely, since the only specimens known to him other than those taken by us in Britain are Meigen's syntypes. Even if Desvoidy's specimens were the same species, the flies taken by us are the first for 130 years.

The opportunity may be taken here of recording a further locality for *Norellia spinipes*. During the Society's field meeting at Cosford Mill, 11.v.69, on the edge of Thursley Common, Surrey, I observed several males of *N. spinipes* on the leaves of a white and yellow flowered cultivated variety of the daffodil (*Narcissus pseudonarcissus* L.). This was growing as a naturalised colony on a bank beside a path in damp mixed woodland on acid soil. Two males were taken from these plants; I have also taken several males, on 15.v.69, on the same daffodil colony, where I found it previously at Hollybush Hill, Bucks. The occurrence of the fly at Cosford, 16 miles from the Sheeples and twice as far from the Buckinghamshire localities, suggests that *N. spinipes* may be of more general occurrence in S.E. England than we had realised. The record is also further confirmatory of the association of the fly with daffodils.

Weston Research Laboratories Ltd.,
644, Bath Road, Taplow,
Maidenhead, Bucks.
1st December 1969

PROCEEDINGS

10th JULY 1969

The President, Capt. J. ELLERTON, R.N., in the Chair

The death was announced of Mr. David More.

The following new members were declared elected: Mrs. E. M. Bankes, Mr. T. Willett-Whittaker, Mr. J. M. Douglas, Mr. R. Lane, Mr. K. G. W. Evans and Mr. L. K. Evans.

EXHIBITS

Mr. & Mrs. T. G. HOWARTH—A fully grown larva of *Eriogaster lanestris* L. (Lep., Lymantriidae) found at Beer, Devon, 29.vi.69.

Mr. S. A. WILLIAMS—A single example of the very local *Atheta cambrica* (Woll.) (Col., Staphylinidae), taken by sieving fine stones and sand on the banks of the river Hodder at Dunsop Bridge, Yorks., 1.vii.69.

Mr. C. G. ROCHE—A collection of 38 species of the social wasps (Hym., Vespidae) from Singapore, Malaya and Borneo. Of particular interest were: (1) *Provespa anomala* Sansure and *P. nocturna* van der Vecht. *Provespa* is a genus of three species of nocturnal wasps. (2) *Vespa analis tyrannica* Smitt, a subspecies which has previously been recorded only from Singapore, and not from there for 50 years or more. The exhibited example, however, was taken in Johore, southern Malaya.

Dr. P. J. L. ROCHE—Hemiptera from Sabah of two families, neither of which is represented in Britain or north-west Europe. (1) Enicocephalidae: four species, not yet identified as the Old World Enicocephalidae, are currently being revised by Dr. Pavel Styre of Prague. (2) Leptoperidae: a new and unidentified species of the genus *Valleriola*.

Col. A. M. EMMETT—Specimens of an unidentified *Dechiria* (Lep., Nepticulidae) taken at Wicken Fen, Cambs., 28.v. and 2.vi.69.

Dr. M. G. MORRIS—(1) A pupa of *Lysandra coridon* Poda (Lep., Lycaenidae) reared from a larva taken at Pewsey Downs National Nature Reserve, 5.vi.69. (2) Preserved larvae, a living pupa in cocoon and set adults of *Phytonomus dauci* (Ol.) (Col., Curculionidae); the larvae were found at Tuddenham, Suffolk, 16.vi.69, in association with *Erodium cicutarium* (L.) L'Hérit. (Common Storksbill).

24th JULY 1969

The President, Capt. J. ELLERTON, R.N., in the Chair

A welcome was extended by the President to Mr. & Mrs. Wickham from South Africa.

The following new member was declared elected: Mr. R. B. Davis.

EXHIBITS

Dr. C. G. M. DE WORMS—A selection of eight coloured drawings of lepidopterous larvae, the work of the late Mr. Norris of Crowborough.

Mr. C. O. HAMMOND—A male and a female *Hammerschmidia ferruginea* Fall. (Dipt.). A very rare Syrphid restricted in the British Isles to northern Scotland. These specimens were taken in the Grantown-on-Spey district where it has been taken occasionally from 1905 onwards. The flies were found visiting the flowers of Wild Rose and Cow-Parsnip.

Comdr. W. GILCHRIST—Two *Apatele alni* L. (Lep., Noctuidae) larvae in their last, black and yellow, instar. These were bred from a female taken at Basingstoke, Hants.

Col. A. M. EMMET—Drawings of the larval mines of a nepticulid larva new to Britain; *Nepticula nitidella* Heinemann, taken at Wicken Fen, Cambs. The insect was originally and provisionally identified by Mr. S. N. A. Jacobs and confirmed by Dr. Joseph Klimesch.

COMMUNICATIONS

Dr. C. G. M. DE WORMS said that at Pirbright during the recent hot weather exceptional numbers of Lepidoptera had arrived at the light trap; the previous evening over 100 species had been recorded before midnight. He added that *Apatura iris* L. (Lep., Nymphalidae) was out in good numbers, and that *Limenitis camilla* L. and *Argynnis paphia* L. (Lep., Nymphalidae) were also well out.

Talking on immigrant Lepidoptera, Mr. R. F. BRETHERTON said that early in July he had recorded four *Nycterosea obstipata* F. (Geometridae); between five and 20 *Nomophila noctuella* Schiff. (Pyralidae) had been seen each night; and one *Laphygma exigua* Hübn. (Noctuidae) had been noted. A number of *Plusia gamma* L. (Plusidae) had also been seen. He questioned if these were in fact primary migrants, or if they were the offspring of insects which had arrived in this country back in May.

It was rarely possible to be sure, said Mr. T. G. HOWARTH, but as a guide it could be said that when a number of different species occurred at the light on the same occasion it was reasonable to suppose these were primary migrants; but if a number of one species occurred without other migrants being present one might then assume them to be secondary migrants.

Nomophila noctuella Schiff. and a single *Nycterosea obstipata* F. was also reported by the President from north Bucks.

Mr. G. PRIOR read a paper 'The Naturalist and the Countryside Acts' which resulted in a lively and interesting discussion.

11th SEPTEMBER 1969

The President, Capt. J. ELLERTON, R.N., in the Chair

The President welcomed Dr. Wewalka and Dr. and Mrs. Schroder.

The death was announced of Mr. W. O. Steel and Mr. O. T. Rich.

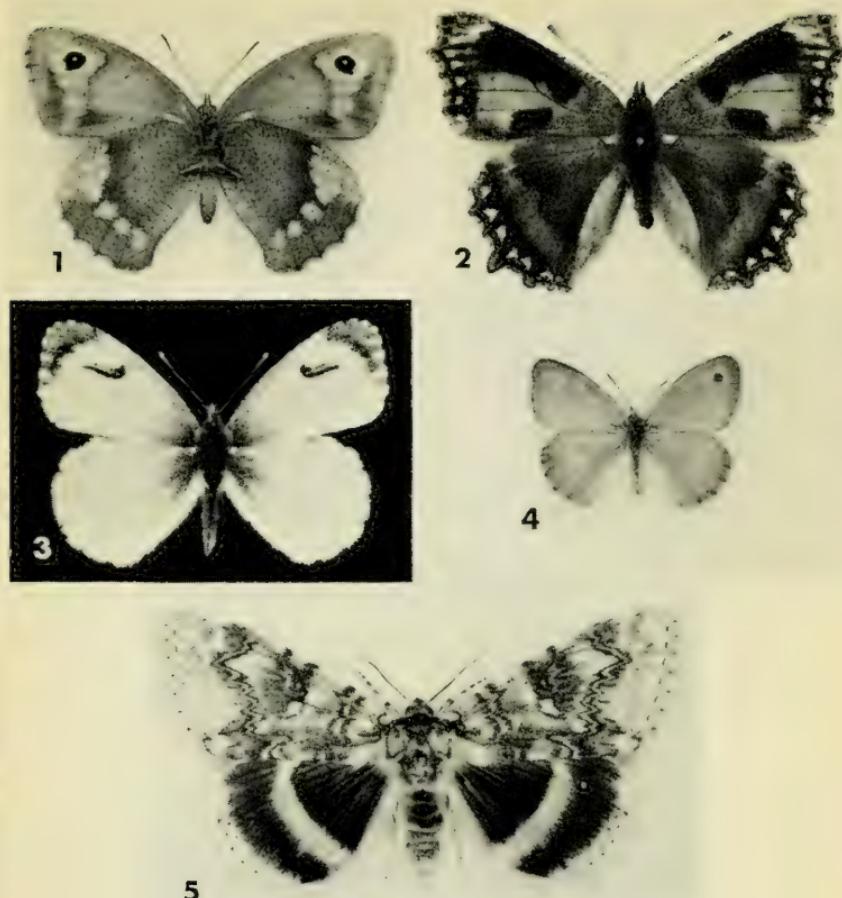
The following new members were declared elected: Mr. M. D. Darby and Mr. R. G. S. Williams.

EXHIBITS

The PRESIDENT—Living larvae of *Stauropus fagi* L. (Lep., Notodontidae).

Dr. WEWALKA—Coleoptera collected on the Stanford-le-Hope, Essex, field meeting; and Dytiscidae and Elateridae from Turkey.

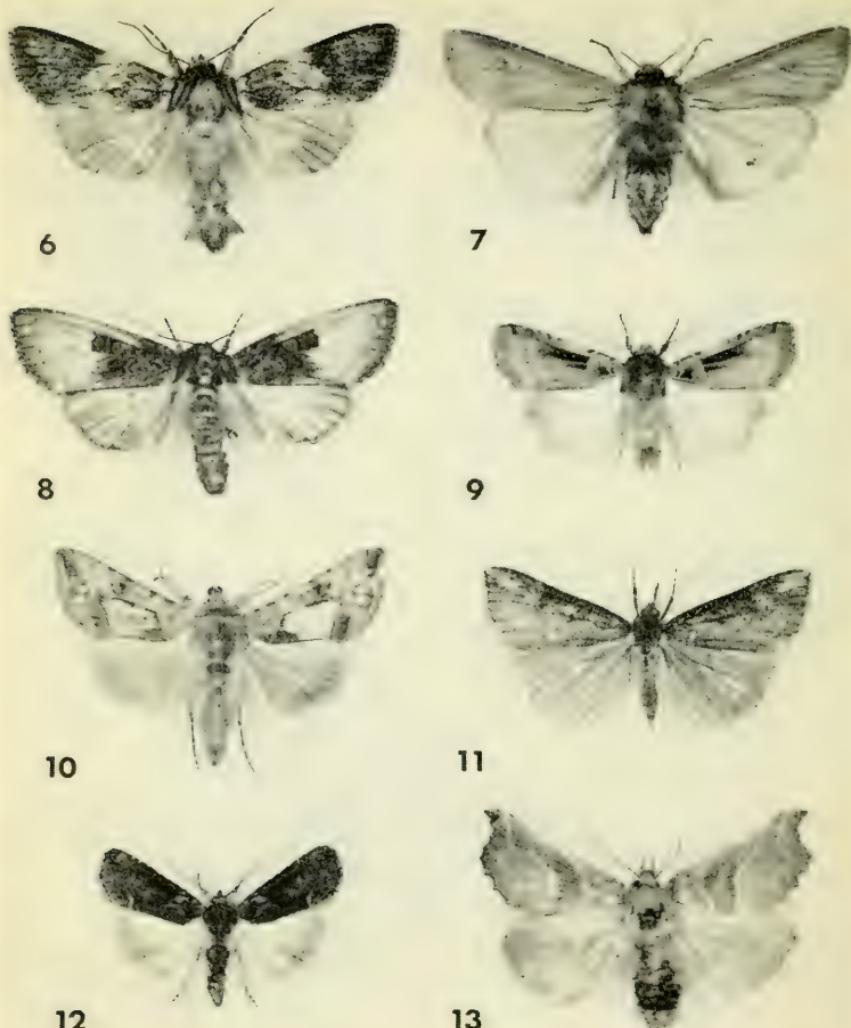
Mr. R. F. BRETHERTON—An extreme aberration of *Plusia iota* L. (Lep.,



(Photographs by Mr. D. J. Carter)

ANNUAL EXHIBITION 1st November 1969

1. *Maniola jurtina* L. ab. *postaurolancea* Leeds, Mr. A. D. A. Russwurm;
2. *Aglais urticae* L. ab., Mr. B. W. Weddell;
3. *Anthocharis cardamines* L. a female aberration, Mr. B. Elliot;
4. *Coenonympha pamphilus* L. ? gynandromorph, Mr. D. H. Walker;
5. *Catocala fraxini* L. female, Mr. A. J. Wightman.



(Photographs by Mr. D. J. Carter)

ANNUAL EXHIBITION, 1st November 1969

6. *Apamea monoglypha* Hufn. ab., Mr. D. W. H. ffennell; 7. *Agrotis ipsilon* Hufn. ab., Mr. J. Briggs; 8. *Melanchnra persicariae* L. ab., Mr. B. W. Weddell; 9. *Amathes c-nigrum* L. ab., Mr. B. Goater; 10. *Plusia iota* L. ab., Mr. R. F. Bretherton; 11. *Hypena obesalis* Treits., Mr. G. S. Woollatt; 12. *Cryphia divisa* Esp., Mr. T. W. Harman; 13. *Scoliopteryx libatrix* L. ab., Mr. J. Roche.



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(Photographs by Mr. D. J. Carter)

ANNUAL EXHIBITION, 1st November 1969

14. *Biston strataria* Hufn. ab., Mr. Austin Richardson; 15. *Deuteronomos alniaria* L. ab., Mr. J. Briggs; 16. *Crocallis elinguaria* L. ab., Mr. J. L. Messenger; 17. *Crocallis elinguaria* L. ab., Mr. B. W. Weddell; 18. *Chiasmia clathrata* L. ab., Mr. D. W. H. ffennell; 19. *Depressaria silesiaca* Hein., Mr. E. C. Pelham-Clinton; 20. *Spilosoma lubricipeda* L. ab., Mr. N. L. Birkett; 21. *Ourapteryx sambucaria* L. ab., Mr. H. E. Chipperfield



Plusidae) found, along with a typical example, in a light trap at Bramley, Surrey, 3.vii.69. A large silvery-white patch fills the lower portion of each wing, there are four silver spots arranged vertically near the margin and the ground colour is an unusually pale strawberry. The wing shape and pattern of lines are, however, those of *P. jota*. So far no description of any similar aberration has been traced for the species, though a form somewhat resembling it is known in *P. gamma* L.

Dr. T. N. D. PEET—Three males and three females of *Ostrinia nubilalis* Hübn. (Lep., Pyralidae) from Merrick Square, Southwark, S.E. London, taken between June and July 1968. The insect was of frequent occurrence there.

Dr. B. J. MACNULTY—Two examples of *Dendrophagus crenatus* Payk. (Col., Cucujidae) from the Abernethy forest, Inverness-shire, 27.viii.69. The beetles were taken from beneath the bark of cut Scots Pine branches. When disturbed the insect flings its antennae forward and takes up the stance of a collembolan, and the resemblance and behaviour is quite striking, though it is much larger.

Mr. P. MATTHEWS—A window display model of the Golden Emperor moth. This model with half a dozen others was shown in the window of Jaeger recently. The model was copied from life and was made of aluminium, sprayed with polyurethane and then hand painted.

COMMUNICATIONS

The following members showed a selection of slides primarily of entomological and botanical subjects: Mr. E. P. WILTSHERE, Dr. T. N. D. PEET, Mr. C. O. HAMMOND, Mr. M. W. F. TWEEDIE and Mr. E. S. BRADFORD.

25th SEPTEMBER 1969

The President, Capt. J. ELLERTON, R.N., in the Chair

The following new member was declared elected: Mr. W. A. Vickers.

EXHIBITS

Mr. A. E. GARDNER—A male *Nebria nivalis* (Payk.) (Col., Carabidae) taken by Mr. G. Vine on Carn Dearg Mor, at 2,337 ft. on Monardhleath mountains, Inv., 13.vii.69.

COMMUNICATIONS

Mr. E. S. BRADFORD recalled taking two examples of *Tineola bisselliella* Hüm. (Lep., Tineidae) in our meeting rooms in June this year. One, he said, died towards the end of July and the second died on 13th August. He commented on the length of time these moths had remained alive.

During the course of his recent duties Mr. T. G. HOWARTH said he had received a letter and a colour photograph of a *Polyxenus* species of butterfly which had been seen near New Blossomfield. Since he was uncertain of the identity he sent the photograph to Dr. Clark at Liverpool, asking at the same time if any had been released. Dr. Clark replied that two had been released on 22nd June and two more on 24th June. New Blossomfield is some 140 miles from Liverpool.

Issoria lathonia L. (Lep., Nymphalidae) was reported to have been seen at Tal-y-wern, Machynlleth by Mr. D. Leatherdale on 3rd September said Mr. P. N. CROW.

Mr. C. O. HAMMOND reported *Volucella zonaria* (Poda) (Dipt., Syrphidae) at Wood Green, N. London; the species had occurred there three times in the

past four weeks. He said that since the insect had been noted over several years it could be assumed to now be established there. Mr. S. WAKELY added that he had taken the fly at buddleia in Camberwell, S. London.

A noctuid, suspected to be new to Britain, had been taken in N. Wales some nine to ten days ago, reported Mr. P. N. CROW.

A male *Orgyia antiqua* L. (Lep., Lymantridae) was reported by Mr. B. Goater to have been seen on Golders Green station, N. London. Mr. S. N. A. JACOBS said he had seen the species at Bromley, Kent, and Mr. E. P. WILTSHIRE said that last summer he had noticed the species outside the Whitehall Theatre in Central London.

Referring to microlepidoptera, Col. A. M. EMMET said that *Cosmopteryx druryella* Zell. (Lep., Cosmopterygidae) was common at Wicken Fen, Cambs.

A series of three slides were shown of peloric foxgloves, *Digitalis purpurea* L. by Mr. B. GOATER.

Mr. V. J. SCOTT gave a talk on fungi which he illustrated with some excellent coloured slides, and which was followed by a discussion.

9th OCTOBER 1969

A Vice-President, Mr. B. GOATER, in the Chair.

The death was announced of Capt. R. A. Jackson, R.N.

EXHIBITS

Mr. B. GOATER—(1) Living larvae of *Eupithecia millefoliata* Rössl. (Lep., Geometridae) from Dungeness, Kent, taken on 5.ix.69. The larvae were local, occurring quite commonly on some patches of old heads of *Achillea* but not on others. (2) *Amathes c-nigrum* L. (Lep., Noctuidae), an aberration on which all three stigmata on the forewings were absent. A faint black streak occurred in the region of the claviform; anterior to this was a narrow black rectangle running from the antemedian line to the region of the reniform, and there was a paler area between this and the costa; other markings were typical, including the black mark in the apex of the wing. The specimen was taken at mercury vapour light at Chandler's Ford, Hants, 28.viii.69.

Col. A. M. EMMET—First bred specimens of *Coleophora tamesis* Waters (Lep., Coleophoridae) from West Galway, Ireland, with cases; and for comparison specimens of *C. taeniipennella* H.-S., also with cases.

Mr. E. S. BRADFORD—A copy of the *British Journal of Photography* containing pictures of a tachinid fly ovipositing on a larva.

COMMUNICATIONS

Mr. B. GOATER reported that he had received a small parcel from the Shetland Isles, together with a request to identify and comment upon the unusual moth therein, which had been found on Collafirth Hill, North Mainland, 19.ix.69, and which had laid a number of eggs in a sweet jar before dying. The specimen was a battered female *Catocala fraxini* L. (Lep., Plusiidae), a species new to Shetland.

A number of unusual second brood moths were reported by Mr. R. F. BRETHERTON to have been found in his light trap which included *Laspeyria flexula* Schiff. (Plusiidae) found two nights previously. Mr. J. L. MESSENGER reported *Hyloicus pinastri* L. (Sphingidae) in his trap.

Lithophane leautieri Boisd. (Lep., Noctuidae) was reported to have been seen in Surrey recently, and Mr. Goater said it had occurred at Winchester, Hants and other inland localities. Dr. C. G. M. DE WORMS added Oxfordshire and Wiltshire. It was suggested by Mr. Bretherton that the species might be found wherever *Cupressus macrocarpa* Gord. blossomed, whilst Mr. S. WAKELY recalled beating the first larvae.

A melanic example of *Amathes c-nigrum* L. (Lep., Noctuidae) was recorded from Woking, Surrey, by Dr. de Worms.

THE ANNUAL EXHIBITION—1st NOVEMBER 1969

Exhibits of macrolepidoptera, if probably no less numerous than in previous years, seemed to be less bulky. There were fewer long series of individual species, and also fewer assemblages illustrating the whole range of the exhibitor's collecting during the season. Emphasis was more on the selection of specimens notable for their rarity, unusual geographic origin, or aberrational interest. The standard of presentation and labelling was improved, though there is still room for a clearer indication of the exhibitor's name, and for more notes about the special interest of the insects shown.

Among the exhibits of insects caught in the British Isles the migratory species were even more in evidence than last year. Some of the most notable were a *Hypena obesalis* Treits. (Pl. 2, fig. 11), possibly only the second British specimen, taken by Mr. G. S. WOOLLATT at Chobham, Surrey, on 14th September; a *Plusia confusa* Steph. found by Mr. R. I. Lorimer and Dr. C. G. M. DE WORMS in Orkney, of all unexpected places; a magnificent *Daphnis nerii* L. obtained by Mr. C. R. Haxby near Bradford, Yorks., on 8th October; a pair of *Eublemma ostrina* Hübn. from Mr. D. W. H. FFENNELL's light trap at Martyr Worthy, Hants, on 15th and 23rd May; a *Uresiphita polygonalis* Schiff. (*gilvata* F.) taken with other migrants by Mr. A. RICHARDSON in Cornwall on 13th September, he also showed a white-barred aberration of *Biston strataria* Hufn. (Pl. 3, fig. 14); and a belated exhibit by Mr. C. W. S. GIBSON of a *Plusia acuta* Walk. from Sherborne Dorset, 25.ix.67. Also of much interest were at least six *Plusia orichalcea* F. from widely scattered places, one as far north as Oxfordshire, and a number of *Cosymbia pupillaria* Hübn., and *Lithophane leautieri* Boisd. from inland localities; the former is possibly, the latter certainly, resident on the south coast, but this year there was a remarkable appearance of them far from the coast at about the same time in mid-October. One or two exhibitors showed selections of *all* the migratory species, common as well as rare, which they had seen in particular periods or localities. This is a practice which might well be extended, since it can throw light on the scope and direction of the various waves of migration.

Striking aberrations were also numerous; a probably unique example of *Plusia iota* L. (Pl. 2, fig. 10) with large white patches and marginal spots on the forewings caught at Bramley, Surrey by Mr. R. F. BRETHERTON; a rather similar *Plusia gamma* L., also from Surrey, by Mr. G. S. WOOLLATT; an albino *Euplexia lucipara* L. by Mr. B. SKINNER; two *Zygaena filipendulae* L. ab. *flava* Robson by Mr. R. C. DYSON, from Wales; and several fine forms of *Aglais urticae* L., including one by a junior exhibitor, Mr. Malcolm Tremewan, and another by Mr. B. W. Weddell (Pl. 1, fig. 2) taken by Mr. David Coney at Lacock, Wilts. Unusual melanic forms were also in evidence; a brown *Selenia lunaria* Schiff., by the PRESIDENT; an extreme *Abrostola triplasia* L. by Mr. S. COXEY; an almost totally

black *Chiasmia clathrata* L. (Pl. 3, fig. 18) by Mr. FFENNELL who also showed an unusual *Apamea monoglypha* Hufn. (Pl. 2, fig. 6); two examples of *Deuteronomos alniaria* L., entirely chocolate-brown except for the thorax and base of the forewings, from Westmorland (Pl. 3, fig. 15) and Surrey, a form apparently not previously recorded; an extreme speckled *Crocallis elinguaria* L. (Pl. 3, fig. 16) by Mr. J. L. MESSENGER; another, quite different form, was shown by Mr. B. W. WEDDELL (Pl. 3, fig. 17) with a *Melanchra persicariae* L. (Pl. 2, fig. 8), both at mercury vapour light at Trowbridge, Wilts.; and notable forms of *Amathes c-nigrum* L. and *Ochropleura plecta* L., by Mr. B. GOATER and Dr. C. G. M. DE WORMS. Mr. Goater's case also included an *Amathes c-nigrum* L. of particular interest (Pl. 2, fig. 9).

A nice example of *Maniola jurtina* L. ab. *postaurolancea* Leeds (Pl. 1, fig. 1) from the New Forest was among the material shown by Mr. A. D. A. RUSSWURM. Mr. B. Elliot showed a female *Anthocharis cardamines* L. (Pl. 1, fig. 3) and Mr. D. N. WALKER, a *Coenonympha pamphilus* L. which appeared to be a gynandromorph (Pl. 1, fig. 4). A female *Catocala fraxini* L. (Pl. 1, fig. 5) appeared among Mr. A. J. WIGHTMAN's insects; it was taken at Ham Street, in 1954, by Mr. W. J. POPHAM. Among aberrations he had taken at Beetham, Westmorland, Mr. J. BRIGGS exhibited *Agrotis ipsilon* Hufn. (Pl. 2, fig. 7).

An example of *Cryphia divisa* Esp. (Pl. 2, fig. 12) was taken by Mr. T. W. HARMAN at mercury vapour light at Worth; Mr. J. Roche showed a striking form of *Scoliopteryx libatrix* L. (Pl. 2, fig. 13); and Mr. N. L. Birkett's *Spilosoma lubricipeda* L. (Pl. 3 fig. 20) was a most unusual form, as was the *Ourapteryx sambucaria* L. (Pl. 3, fig. 21) shown by Mr. H. E. CHIPPERFIELD; Dr. H. D. B. KETTLEWELL illustrated the genetic and temperature factors involved in the *Callimorpha jacobaeae* L. ab. *coneyi* Watson, *Abraxas grossulariata* L. ab. *varleyata* Porritt, various aberrations of *Arctia caja* L. and *Colias croceus* Fourc. f. *schirberi* Oberthur; and Mr. R. W. WATSON showed further results from his breeding of *Callimorpha jacobaeae* L. and a number of aberrations of butterflies.

Activities on the Continent were very well represented by exhibits of butterflies from Scandinavia (Sir GEORGE JOHNSON), from Germany and Malta (Dr. N. BIRKETT), from central Europe (Mr. L. EVANS), the Tyrol (Mr. G. PRIOR), Trieste (Dr. L. G. HIGGINS), and Crete (Mr. R. F. BRETHERTON); and Mr. P. W. CRIBB showed a collection of European *Erebia*. From further afield there was a fine show of West African Lepidoptera by Dr. B. J. MACNULTY, of butterflies from Kenya (Mr. P. CALDERARA), Morocco (Dr. C. G. M. DE WORMS) and the West Indies (Mr. T. J. G. HOMER), as well as of Zygaenidae from Turkey (Mr. W. G. TREMEWAN) and of various oriental species (Mr. J. A. C. GREENWOOD). Mr. S. R. BOWDEN showed more results of his breeding experiments with various races of *Pieris napi* L.

Several exhibits contained insects found on the Society's field meetings, including an interesting series of *Coenonympha tullia* Müll. from the joint meeting with the Lancashire and Cheshire Entomological Society at Whixall Moss, Salop, on 28th June. There were also several showings of Irish Lepidoptera, among them a lovely series of dark blue *Hadena caesia* Schiff. from Co. Clare, by Mr. W. REID, and some *Luperina nickerlii* Freyer s.sp. *knilli* Boursin from the Dingle peninsula, with some light and dark examples of *L. testacea* Schiff. taken at the same time, for comparison.

General interest was provided by some fine photographs of Lepidoptera at rest, given to the Society by Mr. P. A. GODDARD, enlarged colour photographs by Mr. G. E. Hyde, and remarkable paintings of larvae recently presented to the Society by the widow of Mr. DE LA MARE MORRIS. Finally, to encourage accurate

recording, there were once again maps and diagrams illustrating the progress of the National Biological Records Centre's distribution mapping scheme for macrolepidoptera, to which many members are contributing.

The microlepidoptera were well represented. Exhibits consisting wholly or largely of the smaller moths were shown by the President and Messrs. E. S. Bradford, H. E. Chipperfield, H. N. Michaelis, E. C. Pelham-Clinton, S. Wakley and Col. A. M. Emmet, while six other members included some micros (mainly pyrales) in their cases. In general the Society's microlepidopterists, though few in number, are very active and constructively engaged in the study of distribution and life-histories. Upwards of 400 species were on display; these included one species new to the British Isles, eight new to one or other of the constituent countries of the British Isles, and two bred from larvae previously unknown to science. There were also several scarce migrants and local rarities.

Many of the most interesting moths were in Mr. Pelham-Clinton's exhibit of Scottish specimens. This included examples of *Depressaria silesiaca* Hein. bred from *Achillea*; the larvae were taken in Inverness-shire and the species is new to Britain. There were also bred specimens of *Nepticula dryadella* Hof. from the Isle of Rhum and of *Leucoptera orobi* Staint. from Aviemore, Inv., both new to Scotland, and of *Bucculatrix caprella* Krogerus, also from Aviemore, whose larva was previously unknown; its foodplant is *Achillea millefolium* L. Among his other moths were *Eana penziana* Thunb. *Glyptipterix schoenicolella* Staint. and *Ochsenheimeria bisontella* Zell. from Rhum. Mr. Michaelis included *Lobesia littoralis* Westw. and *Roeslerstamnia erxlebella* F. from Lochinver in Sutherland in his exhibit, whilst Mr. M. J. Leech showed *Catoptria permuatella* H.-S. from Moray.

From Scotland we jump to East Anglia—an indication of a sad gap in our members' activities, for apart from the Scottish, Welsh and Irish exhibits, virtually all came from south-east of a line from the Wash to Portland Bill. Mr. J. E. Chipperfield showed some pyrales from Walberswick in Suffolk; these included *Galleria mellonella* L., *Dioryctria abietella* Schiff., *Nephopteryx formosa* Haw., *N. palumbella* F., *Evergestis extimalis* Scop. and *Crambus hamellus* Thunb. Among the Tortricidae he had *Lozotaeniodes formosana* Fröl., while Col. A. M. Emmet showed *Laspeyresia zebeana* Ratz. bred from a larch gall taken at Tuddenham on the field meeting which had this species as one of its principal objectives.

Col. Emmet also showed over 80 species of microlepidoptera from Wicken Fen, Cambs., nearly half of which do not appear in the published lists for that well-known locality. Among the additions were *Choristoneura diversana* Hübn., *Gypsonoma aceriana* Dup., *G. minutana* Hübn., *Elachista apicipunctella* Staint., *Yponomeuta vigintipunctata* Retz., *Coleophora albidella* H.-S. *Nemapogon corticella* Curt. *Nepticula continuella* Staint., *N. splendidissimella* H.-S. and *Dechtiria turbidella* H.-S. To this list must be added *Bucculatrix cidarella* Zell., taken and exhibited by Mr. E. S. Bradford. *D. turbidella* is of interest, as it was first recorded from Britain only 20 years ago and hitherto, it is believed, only from Middlesex. Col. Emmet also showed mines in hawthorn leaves, supported by drawings by Mr. S. N. A. Jacobs, of *Nepticula nitidella* Hein.; this moth is new to Britain and the mines were first found this summer at Wicken Fen. Since it is single-brooded the moths, if bred, will not emerge until next spring. Other well-known Wicken specialities were included in the President's and Col. Emmet's exhibits, such as *Pandemis dumetana* Treits., *Acleris lorquiniana* Dup., *Aristotelia morosa* Mühl., *A. suffusella* Dougl., *A. lutulentella* Zell. and *Brachmia inornatella* Dougl. Another Cambridgeshire moth, this time from Maddingley, was *Dechtiria quinquella* Bed.

The best species from Essex were Mr. Bradford's *Exoteleia dodecella* L. from Debden and Col. Emmet's *Bucculatrix crataegi* Zell. from Benfleet. Mr. Bradford's Hertsfordshire exhibit included several pests of stored products, such as *Ectomyelois ceratoniae* Zell., *Ephestia elutella* Hübn., and (bred from pomegranates) *Cryptoblabes gnidiella* Mill. He also showed *Narycia marginipunctella* Steph., *Acentropus niveus* Ol. (taken far from water), *Lobesia littoralis* Westw., *Epithictis mouffetella* Schiff. and a bred specimen together with cases of the seldom seen *Coleophora cespitiella* Zell. (*agrammella* J.H.W.). All these were from Boreham Wood. An unidentified moth which he took at Bricket Wood was determined during the exhibition as an unusual aberration of *Epinotia brunnichana* L. He showed two plumes from Buckinghamshire, namely *Pterophorus tetricadactylus* L. from Watlington and *Oxyptilus parvidactylus* Haw. from Cadsden. He also showed *Coleophora hemerobiella* Scop. from Middlesex, while Col. Emmet showed a series of *Pammene fasciana* L. from Snareswood in that county; the latter aroused some interest because they were found emerging from pupae situated in the living bark of oak—an unfamiliar habitat. Mr. Wakley displayed several species taken at his home in Camberwell, some of them unexpected moths for the London district. These included *Lobesia littoralis* Westw., a much darker form than the examples shown by others from Scotland, Wales, Ireland and Hertsfordshire. His other specimens included *Achroia grisella* F., *Homoeosoma cretacella* Rössl. and *Caloptilia stigmatella* F.

Kent, as usual, was well represented. Col. Emmet and Mr. Wakely, who often hunt in couples, both displayed bred specimens of *Ethmia terminella* Fletch. from Lydd, *Elachista gangabella* Zell. (*taeniatella* Staint.) from High Halstow and *E. mergerella* Staint., *Stomopteryx taeniorella* Zell. and (notably) *Acrolepia perlepидella* Staint. from Trottiscliffe. That, too, was the locality of *Hypercallia citrinialis* Scop. shown by Mr. Bradford, who also had *Hysterosia inopiana* Haw., *Ptocheuusa paupella* Zell and *Coleophora siccifolia* Staint. from Chesterfield near Whitstable. Biggin Hill produced *Microstega hyalinalis* Hübn., *Olindia schumacherana* Don., *Acompsia cinerella* Clerck and *Nemotois minimella* Zell. (Emmet). The same exhibitor showed series of *Pammene trauniana* Schiff. and *Cosmopteryx eximia* Haw. from localities in Kent, but the gentleman who discovered them does not permit their disclosure. Two good pyrales were Mr. T. W. Harman's *Evergestis extimalis* Scop. from Worth and *Pyrausta funebris* Stroem. from Church Wood.

Surrey produced fewer species than usual. An interesting moth was Bradford's *Coleophora albitalisella* Zell. taken as a larva on the field meeting at White Down in October 1967 and emerging after overwintering twice. Mr. Wakely showed the scarce *Parectopa ononidis* Zell. bred from a larvae taken at Riddlesdown during the field meeting expressly dedicated to that quarry. He also showed the pine-feeding *Exoteleia dodecella* L., *Ocnerostoma pinivariella* Zell. and *Cedesia farinatella* Dup. from Oxshot, which was also the locality of Col. Emmet's *Amphisbatis incongruella* Staint. The latter also exhibited *Nepticula speciosa* Frey. from Mickleham.

If Surrey micros were scarce, those from Hampshire were more numerous than in recent years. From the mainland Mr. Wakely showed *Coleophora squamosella* Staint. (Chilbolton Down) and the Rev. D. J. L. Agassiz *Adela cuprella* Thunb. (North Baddesley) and *Nascia cilialis* Hübn. (Gosport), whilst Mr. L. W. Siggs had the rare migrants *Diasemia ramburialis* Dup. and *Palpita unionalis* Hübn., which were among the moths attracted to his mercury vapour light trap at Minstead in the New Forest. The Isle of Wight produced specimens, almost all bred, from four exhibitors. Mr. Pelham-Clinton showed the salt-marsh form of

Clepsis spectrana Treits (*costana* F.) and *Pammene germanana* Hübn. (he showed specimens of this moth from Kent as well). Mr. E. S. Bradford and Col. Emmet showed specimens of *Pterophorus spilodactylus* Curt., from Freshwater; Mr. Wakely and Col. Emmet showed *Coleophora pyrrhulipennella* Zell., from Godshill; Mr. Wakely had *Agonopterix atomella* Schiff., from Gurnard, and *Pseudoswammerdamia combinella* Hübn., from Niton; while Col. Emmet exhibited two very local moths, *Grapholita gemmiferana* Treits and *Metzneria littorella* Dougl., from Luccombe Chine and Niton respectively. Among his other moths were *Mirificarma lentiginosella* Zell. from Gurnard and *Elachista paludum* Frey from Godshill.

Dorset, as usual, was amply represented by specimens from Portland. Its well-known specialities were on show, viz.: *Epischnia bankesiella* Rich. (Agassiz and Chipperfield), *Agdistis staticis* Mill (Chipperfield) and *Meesia richardsoni* Wals. (the President and Col. Emmet). Other moths shown by one or more of the same quartet included *Nephopteryx semirubella* Scop., *Metzneria lapella* L., *M. carlinella* Staint., *Scrobipalpa ocellatella* Boyd, *S. seminella* Pierce, *Telephila schmidella* Heyd., *Elachista subocellea* Steph., *Scythris senescens* Staint. and *Teichobia verhuellella* Staint.

Cornwall was represented by the very rare migrant *Uresiphita polygonalis* Schiff. taken by Mr. Austin Richardson on the Lizard peninsula.

As in 1968 Wales produced some interesting specimens. Pride of place goes to Mr. Michaelis' *Caloptilia sulphurella* Haw. from Glan Conway in Denbigh, which is new to the principality. From the same locality he had *Clepsis rurinana* L., *Epagoge grotiana* F., *Clavigesta purdeyi* Dürr. and *Nemapogon arcella* F., while from the nearby Eglysbach came *Parornix scoticella* Staint. The neighbouring county of Caernarvon afforded *Acleris literana* L. and *Nemapogon granella* L. (bred from birch polyporus) from Ro-wen and *Bucculatrix demaryella* Staint. from Trefriw. The Rev. Agassiz also showed *Clepsis rurinana* L. and *Pterophorus spilodactylus* Curt. from the same general area. Mr. Leech had specimens of *Pyrausta funebris* Stroem from Tre-R-ddoll and Mr. Pelham-Clinton showed *Caloptilia semifascia* Haw. from Tintern.

The west of Ireland again proved its attraction to lepidopterists. The most interesting specimen from the Burren was *Lithocolletis insignitella* Zell., which is new to Ireland. The mines in clover were noticed by Dr. J. D. Bradley and were then collected by several other entomologists; from these single moths were bred by Col. Emmet (the one on display) and Mr. Pelham-Clinton. The latter also showed a bred series of *Pammene spiniana* Dup. and the former the well-marked local race of *Pempelia dilutella* Hübn., *Catoptria margaritella* Hübn., *Laspeyresia gallicana* Guen., *Lobesia littoralis* Westw., *Pyrausta sanguinalis* L. and *Eana penziana* Thunb. The last species was also shown by Mr. R. F. Bretherton, the grey hues of these Burren specimens differing markedly from the contrasted black and white coloration of examples from elsewhere.

Finally, Col. Emmet showed a number of specimens from Ballyconneely and its neighbourhood in west Galway, which included several species new to Ireland. In this category were bred series of *Coleophora adjunctella* Hodgk., *Lithocolletis sorbi* Frey., *L. quinqueguttella* Staint. and *Ancylis inornatana* H.-S. (the last-named species was emerging at the time of last year's exhibition and one or two of the moths were then displayed). Seventeen of the other species shown were new to the vice-county of west Galway, the most interesting of which was a short series of *Coleophora tamesis* Waters bred from *Juncus articulatus* L.; the larva was previously unknown. There was also a bred series of *Microsetia stipella* Hübn., the first fully authenticated Irish examples, though the larvae were

recently observed in the Burren. Other species of interest were *Pammene spiniana* Dup., *Agonopterix yeatiana* F., *Elachista exiguello* Frey, *Argyresthia semifusca* Haw., *Lyonetia clerkella* L., *Stigmella rosella* Schrank and *S. hybnerella* Hubn.; the last species does not appear to have been recorded from Ireland for over a century.

Among the Coleoptera this year there were only five exhibits. An interesting collection of local and rare species was displayed by Mr. J. Cooter which included an example of *Dictyopterus cosnardi* (Chev.) from Goodwood, Sussex, 25.v.69, which is only the third example to have been taken in the British Isles. Other noteworthy species were: *Achenium depresso* (Grav.) from Pagham Harbour, Sussex, 13.viii.66; *Xantholinus tricolor* (F.) from Nethy Bridge, Inv., 10.vi.66; *Trachys pumila* Ill., from Goodwood, Sussex, 25.v.69.

Mr. D. Appleton showed 24 species of Coleoptera among which was *Pterostichus aterrimus* Herbst which he first took on 2.vi.69 in a marshy area in the New Forest. The species used to be a fenland insect, but has not been recorded in England since Hudson-Beare took it at Stalham, Norfolk in 1910, though it is still to be found in Ireland; Mr. Coulter also exhibited an example. He also showed an example of *Stichoglossa semirufa* Er. which he took in the New Forest, 3.v.69. This is only the second British specimen, the first being taken by Fowler in Essex in 1898. Mr. A. A. Allen confirmed the identification.

An extremely interesting exhibit was presented by Mr. A. E. Gardner, which illustrated Coleoptera associated with wasp and hornet nests. Besides the well-known, though seldom met, *Meteocles paradoxus* L. which was borrowed from the Coulson collection, he showed the following species: from a hornet's nest, a series of *Velleius dilatatus* F., bred June 1969 from larvae found 23.xi.68 at Denny Wood in the New Forest, Hants.; *Cryptophagus micaceus* Rey, a series also from Denny Wood, 22.x.67. From the nest of a tree wasp, *Vespa sylvestris* Scop. *Cryptophagus micaceus* Rey. From the nest of the common wasp, *Vespa vulgaris* L., *Quedius ochripennis* Menet, a single example, Oxshott, Surrey, August 1916, ex Ashby coll.; *Cryptophagus pubescens* Sturm, Wood Walton Fen, Hunts., 9.x.60, and Denny Wood, 12.x.69. He also showed a nest and examples of the Hymenoptera concerned.

Phytobius canaliculatus Fahr. taken in the Burren, Co. Clare, Ireland, in September 1969, was shown by Dr. M. G. Morris, who discovered this species was capable of swimming on the surface of the water.

Mr. S. A. Williams showed the following Staphylinidae Col. from Horton Kirby, Kent: *Ischnopoda coarctata* Er., *I. constricta* Er., *Carpelimus incongruus* Steel, *Proteinus macropterus* Gyll., *Atheta elongatula* Grav. s.sp. *bacanica* Brundin, *Neobisneus villosulus* Steph. and *Stenus biguttatus* L.

Mr. J. M. CHALMERS-HUNT exhibited some 40 selected items from his Museum of Early Entomological Materials, amongst which were: (1) a specimen box with butterfly design on the lid, c. 1850; (2) a bull's-eye lanthorne, c. 1860; (3) an assembling tin (donated by Mr. S. N. A. Jacobs); (4) a sugaring tin, c. 1895; (5) a pair of net forceps (donated by Mr. T. J. Honeybourne); (6) a curious cylindrical mahogany pin box, with swivel top and aperture for selecting size; (7) an iron relaxing tin, with spring catch, Deyrolle, Paris, c. 1890 (donated by Mr. E. Janmoule); (8) an ornate zinc and lamp-glass larva cage; (9) an elegant brass magnifier, with folding stem and turned ivory handle, c. 1830; (10) metal creosote cups, used by William West of Greenwich, c. 1875; (11) a double larva breeding cage, with decorative pokerwork design, date and history unknown (donated by Mr. A. L. Goodson); (12) 19th century pin sample cards (donated by Messrs. G. Campbell and A. E. Gardner); (13) a pin from the Linnaean collection

(donated by Mr. P. E. S. Whalley); (14) various types of early larva collecting boxes (donated by Messrs. R. F. Birchenough, M. Schaeffer and E. J. Trundell). He further exhibited a number of items lent by courtesy of the Royal Entomological Society, including an insect transporter and a turned brass pinning stage, used by W. G. Blatch; a pair of net forceps, used by William Jones; and some early net Y-pieces. Also, a brass chloroform bottle, lent by courtesy of the Royal Scottish Museum, through Mrs. E. C. Pelham-Clinton; and a British Museum type pinning stage, kindly lent by Mr. P. E. S. Whalley.

An example of the Brown-banded Cockroach, *Supella supellectilium* Serv. found in a loaf of bread at Sheffield on 1.x.69, was shown by Mr. P. J. CHANDLER. This is the first record for the north of England.

The Zoological Society of London showed a large and interesting selection of live tropical spiders, centipedes, stick insects and preying mantids. These, as usual were attractively displayed and evoked considerable interest.

13th NOVEMBER 1969

The President, Capt. J. ELLERTON, R.N., in the Chair

The following new members were declared elected: Messrs. B. E. Pickton, J. O. Clifford, R. C. Revels, and D. Goddard.

EXHIBITS

Col. A. M. EMMET—(1) Cases of *Coleophora wockeella* Zell. (Lep., Coleophoridae) taken on *Stachys officinalis* L. (*betonica* Benth.) on the Hants.-Surrey border 13.ii.69. (2) Two oak leaves from Maddingley, Cambs. One containing seven *Dechtriria quinquinella* Bed., (Lep., Nepticulidae), four *D. subbimaculella* Haw. and one *Lithocolletis* species. The other containing three *Dechtriria subbimaculella* Haw., one *Lithocolletis* species and one feeding believed to be *Ptycholoma lecheana* L. (Lep., Tortricidae).

Mr. G. M. DE ROUGEMONT—Two associated species of Coleoptera: *Platypus cylindrus* F. (Platypodidae) and its predator *Colydium elongatum* F. (Colydiidae), both from Normandy, France. The two species were common in Normandy in oak and beech, but sometimes occurred in apple.

COMMUNICATIONS

Referring to Mr. de Rougemont's exhibit Mr. A. E. GARDNER said *Colydium elongatum* F. was, in this country, confined to the New Forest, Hants, and was considered rare. He had found it on a number of occasions and suspected its movements to be nocturnal. On several occasions he had found the species by torchlight at night. In his opinion the distribution in the New Forest was wider than popularly supposed, and certainly extended beyond Denny Wood. Mr. DE ROUGEMONT added that in his experience the species always occurred in felled timber and usually when the bark was loose. In Normandy he said the species did not occur in forests, but usually in hedgerows, etc.

Vanessa atalanta L. (Lep., Nymphalidae) was reported to have been seen by Mr. T. G. HOWARTH at Beer, Devon, 9.xi.69, and Mr. S. N. A. JACOBS said he had seen one recently in Ashdown Forest, Sussex.

A Clouded Yellow, *Colias croceus* Fourc. (Lep. Pieridae) was reported to have

been seen during the first week in November. Mr. B. GOATER said *Vanessa cardui* L. (Lep., Nymphalidae) had been noted on the north Norfolk coast recently.

At Exmouth on 9.x.69 Mr. F. T. VALLINS had seen a single *Colias croceus* Fourc. flying up the estuary. Following the insect's flight he discovered a clover field in which were some nine or ten examples of the same species. He also reported an enormous number of *Vanessa atalanta* L. at Budleigh Salterton, Devon, 10.x.69 on a small patch of Ivy blossom. Some 50 or more examples were estimated to be present.

A discussion took place on the Annual Exhibition during which the President said that several years ago the migrant *Palpita unionalis* Hübn. (Lep. Pyralidae) was regularly recorded. He had seen no recent records and asked if anybody had seen the species recently. Mr. S. A. KNILL-JONES said he had taken the species for the past six years. An opinion was expressed that species such as this were regularly recorded until the novelty wore off and were then ignored.

A discussion took place on Mr. J. M. Chalmers-Hunt's exhibit of historical equipment, apparatus and materials; and it was suggested that any such items would be welcomed by the Society and would be passed on to either the British Museum (Nat. Hist.), which Mr. T. G. Howarth said already had some of this kind of equipment, or to Mr. Chalmers-Hunt.

27th NOVEMBER 1969

The President, Capt. J. ELLERTON, R.N., in the Chair

The following new members were declared elected: Messrs. K. N. Bascomb, D. E. Wilson, J. Culplin, R. W. Rowley, I. Watkinson, G. E. Harnes, C. W. D. Gibson and Mrs. S. J. L. Mansfield.

EXHIBITS

Mr. G. M. DE ROUGEMONT—A series of *Cerocoma schreberi* F. (Col., Meloidae) and one example of *C. schafferi* L., taken at Venelles, France during August 1969, with a drawing of the antennae of *C. schafferi*.

Mr. C. F. RIVERS—Larvae of *Danaus plexippus* L. (Lep., Danaidae) reared on greenhouse grown plants. Attempts to rear this species on an artificial media are meeting with success.

COMMUNICATIONS

Mr. RIVERS reported taking two *Lithophane leautieri* Boisd. (Lep., Noctuidae) at light in his garden at Oxford on 21st October last; Mr. R. F. BRETHERTON also reported captures of this insect at Swindon and in Surrey on about the same date and he thought that this pointed to a migration.

Mr. Rivers also asked that any diseased insects might be sent to him at the Insect Pathology Unit, Department of Forestry, South Parks Road, Oxford, for diagnosis.

Mr. B. Goater said that the preparation of a county list of Lepidoptera for Hampshire and the Isle of Wight was well under way and he would be glad of any further records.

Mr. J. HEATH of the Biological Records Centre at Monks Wood Experimental Station then gave a most interesting talk on 'Recording Britain's Insects'.

11th DECEMBER 1969

The President, Capt. J. ELLERTON, R.N., in the Chair

The President congratulated our member J. D. Bradley on gaining a PH.D. (c.sc.).

The following new members were declared elected: Mr. B. J. Lampit and Mr. M. W. Beresford.

EXHIBITS

Mr. G. M. DE ROUGEMONT—A gold Victorian brooch set with an opal and five specimens of *Desmonota variolosa* F. (Col., Chrysomelidae), a South American species often used in jewellery in those days.

COMMUNICATIONS

Dr. B. J. MACNULTY gave a talk on 'Outline Life Histories of some West African Lepidoptera; Arctiidae, Syntomidae and Cycnidae', which he illustrated with coloured transparencies.

8th JANUARY 1970

The President, Capt. J. ELLERTON, R.N., in the Chair

The death was announced of Mr. H. Symes.

The following new member was declared elected: Mr. Atabar Kudrna.

EXHIBITS

Mr. B. GOATER—Two species of pyralid Lepidoptera, both taken at mercury vapour light at Mill Hill, Middx.; *Ectomyelois ceratoniae* Zell., 23.viii.55, and *Cadra parasitella* Staud., 22.v.60.

COMMUNICATIONS

A series of coloured transparencies illustrating aspects of the past season's collecting were shown by Dr. C. G. M. DE WORMS.

A brief discussion took place on the status of *Endromis versicolora* L. (Lep., Bombycidae) in Scotland; and another on *Cadra parasitella* Staud. (Lep., Pyralidae).

FIELD MEETINGS

FLEAM DYKE, CAMBRIDGESHIRE—3rd May 1969

Leader: Col. A. M. EMMET

The meeting had a dual purpose—to look for the imagines of *Eucosma pauperana* Dup., which was taken at Fleam Dyke in 1930 and 1931, and to collect the galls made by *Laspeyresia zebeana* Ratz. on larch in the Tuddenham district of West Suffolk. Nine members attended, six of them lepidopterists, the other three being coleopterists. It was decided to look for *L. zebeana* first as *E. pauperana* would be more likely to be found flying in the afternoon.

The *L. zebeana* galls were not difficult to find, though many of them were out of reach; however, almost all were the old mines which are hard and woody, unlike those tenanted, which are soft to the touch. Two fresh galls were found which produced one moth and a female example of the parasite *Scambus linearis* Ratz. (Hym., Ichneumonidae). The identity was determined by Mr. J. H. Kerrich of the British Museum (Nat. Hist.), who states: 'At one stage, *linearis* was placed in synonymy with *sagax* Htg., but is now thought to be a good species. A good series of specimens of both sexes is greatly desired. There is no male associated with the few females placed as *linearis* in the British Museum collection.' The specimen has, accordingly, been given to the British Museum.

A number of other larvae was taken, principally on *Pinus sylvestris* L. These included *Pseudococcyx posticana* Zett., *Cedestis farinatella* Dup. and *Ocnerostoma friesii* Svenssen. An imago of the last species was taken, already emerged. As far as is known, no *O. piniariella* Zell. were bred (the two species have only recently been separated).

The lepidopterists moved on to Fleam Dyke in mid-afternoon. Though the ground seemed suitable enough, with wild rose, the foodplant, in plenty, no specimens of *Eucosma pauperana* Dup. were seen. A few junipers produced larvae of *Eupithecia sobrinata* Hübn. and *Dichomeris marginellus* F.

COSFORD MILL, SURREY—11th May 1969

Leader: Mr. J. L. MESSENGER

After a wet and unpromising night the weather gradually improved throughout the day and the meeting took place in fine and quite warm conditions, with occasional brief periods of sunshine.

Thirteen members and two guests attended though not all were able to be present throughout the whole of the day. In the morning the party divided into two halves, making it possible to work both sides of the lake and the wooded hinterland.

The spring and overwintering butterflies appeared in reasonably good numbers during the short periods of sunshine around midday. Eight species were recorded; the most interesting of which were *Polygona c-album* L. and *Pararge aegeria* L.; but moths were unexpectedly scarce, only a few specimens of the commonest geometers being seen. This may have been due to the very wet conditions of the previous night which had probably forced them into the remoter sheltered places from which they were not easily disturbed.

Larvae were also scarce, but the microlepidopterists found those of a number of common species, and larvae of *Cedestis gysseleniella* Zell. were turned up feeding in pine needles.

Diptera were in profusion, feeding on laurel blossom and at the many wild flowers which thrive on the steep wooded slopes which surround the lake. A number of interesting species were recorded including *Myopa testacea* L., *Brachyopa scutellaris* R.-D., and *Sphegina clunipes* Fall., but the great event of the meeting was the capture by Mr. P. Chandler of three examples of *Norellia spinipes* Meig., a species new to the British list and which is associated with daffodils (see 1969 & 1970 Proc. Brit. ent. nat. Hist. Soc., 2(4):120-4, 3(1):12).

Coleoptera were scarce and no records of interest were produced.

At the close of a most enjoyable day our hosts, Mr. and Mrs. A. J. Loarridge, entertained the large party to a most excellent tea in their delightful waterside home.

GODALMING, SURREY—24th May 1969

Leader: Mr. ALAN E. STUBBS

The area visited by a party of seven members, was the marshy ground and woods by the River Wey a mile east of Godalming. A still warm start to the day seemed full of promise, but rain fell for half an hour at the start of the meeting, so that sweeping and disturbing geometers had little success. However by lunch time the sun was out and insects were in good numbers in the afternoon.

In the morning the path on high ground through woodland was followed. An elm log bearing *Polyporus squamosus* Fr. yielded the fungus feeding flies *Drosophila confusa* Staef. and *Helomyza variegata* Loew. Two crane flies were taken which are new to the locality list, *Tipula pabulina* Meig. and *T. pseudovariipennis* Czizek. The only geometer was *Xanthorhoe montanata* Schiff.

On some open marshy ground *Epirrhoe alternata* Müll. and *Chiasmia clathrata* L. were frequent and a specimen of the sawfly *Arge cyanocrocea* was taken on *Anthriscus sylvestris* (L.) Hoffm. flowers.

In the afternoon attention was paid to the sandy margins of the River Wey. Here it was pleasing to find the large damselfly *Agrión splendens* Harris commonly, where alders and open bank alternated, and several nymphal skins were found on the vegetation along the bank. A single specimen of *A. virgo* L. was found where alders formed denser shade and *Pyrrhosoma nymphula* Sulz. frequented the more open parts. The most notable member of the river fauna was the crane-fly *Hexatomā fuscipennis* Cart., a species associated with upland shingle streams until found here two years ago.

A ditch beneath alder contained a good show of flowering Marsh Marigold, *Caltha palustris* L., and sweeping at this spot yielded a number of *Ptychoptera scutellaris* Meig., a fly whose larva breeds in shallowly submerged mud. The only previous Surrey record is from Bookham Common (L. Parmenter, 1966, *Lond. Nat.*, 45:57); a national survey has shown this species to be particularly scarce in the south-east.

Where open marshes bordered the alders along the banks of the river, *Rhagio notata* (Meig.) were in good numbers, mostly males, and scattered individuals were also found in wood glades. This fly was formerly thought to be restricted to upland districts, which in the west Pennines shows a preference for limestone mountains. A specimen of the micropezid fly, *Calobata ephippium* F., was found beside the river in the shade of alders, a species which appears to be scarce in Surrey.

Though the lepidopterists faired poorly, with species such as *Anthocharis cardamines* L. providing welcome interest, the general impression of the locality was very favourable, the rain being blamed for the reluctance of the geometers to fly. The area is certainly very rich in diptera, including several 'upland' species and continuing studies should reveal further distributional misfits. To would-be entomological visitors, it should be mentioned that the most productive season is over by mid-July.

ALICE HOLT, HANTS.—8th June 1969

Leader: Mr. J. A. C. GREENWOOD

Eleven members attended this meeting which coincided with a spell of excellent weather. In spite of the activities of the Forestry Commission, who have replaced large areas of oak and other deciduous trees by plantations of conifers, much attractive woodland survives and provides something of interest to all.

Only nine species of butterflies were seen on the wing, including worn specimens of *Clossiana selene* Schiff. Full-fed larvae of *Quercusia quercus* L. were beaten from oak, presumably the last still feeding as most, if not all, produced female butterflies. Several larvae of both Copper Underwings were found, and it was felt that the differences between *Amphipyra pyramidea* L. and *A. berbera* Rungs were not difficult to detect at this stage.

The area near the smaller pond was worked for Odonata by Mr. Hammond who recorded the following species: *Libellula quadrimaculata* L., *L. depressa* L., *Orthetrum cancellatum* L., *Cordulia aenea* L., *Erythromma najas* Hanse., *Coenagrion puella* L., *Enallagma elegans* V. d. Lind., *Pyrrhosoma nymphula* Sulz. and *Agrion splendens* Harris.

No other member has reported identifications of special interest.

HOLME FEN NATIONAL NATURE RESERVE, HUNTINGDON—
14th June 1969*Leader:* Dr. M. G. MORRIS

Although it was a warm, dry day only one member (and his family) joined the leader at Holme Station. It was decided to go to Woodwalton Fen before lunch to work the poplars for *Sesia apiformis* Clerck, but this was unsuccessful although old borings were plentiful. Beating various shrubs under the poplars (*Populus × canadensis* Moench var. *scrotina* (Hartig) Rehder) produced several specimens of the weevil *Dorytomus filirostris* Gyll., still a very local, though probably spreading, species.

Back at Holme Fen after lunch a good turn-out of members of the Huntingdonshire Fauna and Flora Society emphasized the disappointing attendance by our own Society. The wide drove leading to Stilton Rough was worked, without many insects being in evidence. The acid (red) peat here contrasts markedly with the more alkaline fen peat at Wicken Fen and over most of Woodwalton Fen. The luxuriant growth of *Rumex acetosella* agg. supported such insects as the butterfly *Lycaena phlaeas* L., and the weevils *Apion haematodes* Kirby and *Rhinoncus castor* F. The moth *Lithina chlorosata* Scop. and the delphacid leafhopper *Ditropis pteridis* Spinola were disturbed or swept from bracken, *Pteridium aquilinum* L. Kuhn.

Towards the end of the meeting the party went to the Decoy, the only Huntingdonshire locality for *Sphagnum*. Here the extremely local *Luzula pallescens* Sew. was seen. On the way back to the cars beating Birch, so abundant at Holme Fen, produced several common geometrid larvae and an example of the 'longhorn' beetle *Leiopus nebulosus* L.

Some members of the Societies took the opportunity of examining the famous 'Holme Fen Post' before going on to the house of Mr. I. McPhaill, the Reserve Warden. Here, an excellent tea was provided by Mrs. McPhaill. After an inter-

esting discussion about the Reserve and other matters over tea the party finally dispersed, having had an extremely pleasant, though rather unproductive day.

WICKEN FEN, CAMBRIDGESHIRE—21st June 1969

Leader: Col. A. M. EMMET

It was disappointing that a meeting held at such a famous and productive locality was attended by only four members, all predominantly microlepidopterists. The activities fell into three phases: first, the search for larvae; second, netting imagines during the evening flight; and third, after dinner at the local pub, the use of lights on the fen. It was a pity that a sharp fall in temperature made the third phase relatively unproductive.

One of the objects was to search for the larva of *Ancylis paludana* Barr. and *Sorhagenia rhamniella* Zell. The season however, was a late one, and although the larva of the former was easy to find, they were too small to be worth taking, as no one had access to fresh supplies of the foodplant, *Lathyrus palustris* L.; there were even one or two late imagines of the first brood still on the wing. Numerous spinnings on *Frangula alnus* Mill. were taken in the hope of finding the second species, but all turned out to contain larvae of *Ancylis apicella* Schiff.; again we were too early.

Among the interesting imagines captured were: *Lithacodia fasciana* L., *Eustrotia bankiana* F., *Eupithecia pygmaeata* Hübn., *Phragmataecia castanea* Hübn., *Phalonidia mannianna* F.R., *Ancylis diminutana* Haw., *Endothenia ustulana* Haw., *Telphusa notatella* Hübn., *Cosmopteryx druryella* Zell., *Bucculatrix alnella* Vill., *B. cidarella* Zell. and *Nemophora metaxella* Hübn.

BRECK, SUFFOLK—29th June 1969

Leader: Mr. B. GOATER

The weather was very warm and sunny for most of the day, and it was a pity that only two members of the Society and their families joined the leader at Mildenhall, with the object of exploring new ground in this very rich and interesting area.

While waiting for the party to assemble, those present found widespread evidence of the activities of *Sesia apiformis* Clerck in the bases of old poplar trees, though no moths and no recent pupa cases were detected.

The morning was spent working the area of pine and heath beside the A11 about half a mile beyond the roundabout at Barton Mills. Plenty of *Ematurga atomaria* L. were flying amongst the heather, and a few *Anarta myrtilli* L. were dashing about and settling on the heather shoots. *Bupalus piniarius* L. was abundant and rather variable amongst the pines, from the foliage of which a larva of *Panolis flammea* Schiff. was beaten. A pair of Nightjars flew out of the bracken, but a search of the area revealed neither eggs nor young birds. Respects were paid to the now well-known colony of *Orchis militaris* L.; the flowers were past their best, but nevertheless made an impressive and beautiful sight.

The stretch of waste ground beside the River Lark was disappointing from the entomologists' point of view; the only insect of any note which occurred was *Homoeosoma sinuella* F.

After lunch the party moved on to some disturbed ground near Tuddenham which abounded in Breckland weeds, themselves a fascinating study. They included *Crassula tillaea* L.-Garland along the side of a well-worn path, abundant *Sedum acre* L., *Scleranthus annuus* L., *Filago germanica* (L.) L. and *Arenaria* sp. Both *Verbascum nigrum* L. and *V. thapsus* L. were common and supported the larvae of *Cucullia verbasci* L. By grubbing about under *Erodium cicutarium* (L.) L'Hérit., the party came across several larvae of the weevil *Phytonomus dauci* Ol., looking remarkably like those of a lycaenid at first glance. *Ceuthorhynchus asperifoliarium* Gyll. was found under *Echium vulgare* L. and also *C. erysimi* F., *Apion haematodes* Kirby (*frumentarium* (Payk.)) occurred under *Rumex acetosella* agg. in the light, sandy, soil. The *Echium*, which grew in a wide swath over 200 yards long, was a fine splash of colour; a few of the plants had white flowers. A specimen of *Hadena bicolorata* Hufn. (*Hecatera serena* F.) was found on one of the heads, but we were disappointed not to see any *Heliothis viriplaca* Hufn.

CHIPPENHAM FEN, CAMBS.—13th July 1969

Leader: Mr. B. GOATER

This was another hot and humid day, and the three lepidopterists who attended the meeting found plenty to interest them even if it was hard to summon the energy to set off in pursuit. Diptera were much in evidence and it seemed a pity that no specialist in the Culicidae and Tabanidae could have been present, to repay some of the attention the females of those groups were paying to the human intruders.

The commonest butterfly was *Aphantopus hyperantus* L., then *Ochlodes venata* Br. and Grey. *Pieris brassicae* L., *P. rapae* L., *P. napi* L., *Maniola jurtina* L. and one *Strymonidia w-album* Knock were seen. Along the grassy rides, *Eustrotia bankiana* F. was fairly common and one *E. uncula* Clerck was taken. *Rivula sericealis* Scop. was common and very fresh, and several *Lithacodia fasciana* L. (*Jaspidea pygarga* Hufn.) were disturbed from the trunks of trees. Wherever *Eupatorium* grew in heavy shade, there we were certain to find *Perinephela lancealis* Schiff. Other species recorded were *Lygephila pastinum* Treits., *Plusia gamma* L., *Ectypa glyphica* L., *Sterrhia muricata* Hufn., *Scopula immutata* L., *Epippoe alternata* Müll., *Lomaspius marginata* L., *Deilinia exanthemata* Scop., *Alcis repandata* L., *Haritala ruralis* Scop., *Evergestis pallidata* Hufn., *Eurrhypara hortulata* L., *Crambus perlellus* Scop., *C. hortuellus* Hübn., *Agriphila culmella* L. and *Pterophorus pentadactyla* L.

The fen is wonderfully rich in plants (hence the variety of insect life); a great abundance of *Juncus subnodulosus* Schrank was noticed, quantities of *Cladium mariscus* (L.) Pohl, *Carex* spp., a fine show of *Dactylorhiza praetermissa* (Druce) Vermeul. and a few scattered specimens of *Selinum carvifolia* (L.) L. were among those which caught the eye.

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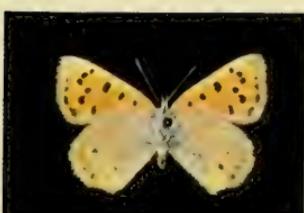
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Homoeosis and related phenomena in the Small Copper Butterfly, *Lycaena phlaeas* L.

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- 2 Bilateral underside homoeosis (Specimen 25)
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- 5 Underside heteromorphosis (Specimen 38)
- 6 Underside heteromorphosis (Specimen 42)
- 7 Underside heteromorphosis (Specimen 43)
- 8 Form with pale areas on underside (Specimen 45)

or a key to the specimen numbers see Robertson, T.S., Proc. Brit. ent. nat. Hist. soc. 1969, 87-89



PRESIDENTIAL ADDRESS

Capt. J. ELLERTON, D.S.C., R.N.

In 1969 we seem to have sustained an unusually high number of deaths and it is my sad duty to say something of those members who have passed on:

Mr. A. G. Carolsfeld-Krause, one of our Danish members who joined the Society in 1950, was, of course, very well known to all microlepidopterists as the leading authority on the Nepticuloidea. He was always most helpful in the identification of mines, and his kindness and advice will be much missed.

Mr. G. W. Cruttwell, a lepidopterist who joined the Society in 1950, was a solicitor in Frome for most of his life. He collected in that district and in Wiltshire where he once took the Long-tailed Blue.

Mr. Edgar J. Hare, C.B.E., joined the Society in 1902 and in 1953 was made a Special Life-member. A lepidopterist who right up until his death was a keen collector—a great character who went out of his way to help and encourage the young.

Captain Reginald A. Jackson, C.B.E., R.N., joined the Society in 1940 and was President for the years 1945–6. He was an ardent lepidopterist all his life. His son has most kindly presented to the Society his father's entomological diaries, which are of great interest and of considerable scientific value, and his collection of moths.

Captain D. G. Marsh, who joined the Society in 1930, was a keen lepidopterist who in his earlier days collected butterflies. He then turned his attention to moths, amassing a very representative collection before turning his attention to micros. A feature of his collection was his wonderful setting.

Mr. Charles Mellows joined the Society in 1946 and was for many years a master at Bishop's Stortford College where he did a lot of collecting locally. He used to go annually to the Norfolk Broads and had an expert knowledge of the Lepidoptera in that area.

Mr. David More, who joined the Society in 1951, lived near Rayleigh in Essex, had a wide experience in collecting. He was by profession an expert in antique silver and was a Colonel in the Territorial Army.

Mr. L. Parmenter, a life member, joined the Society in 1946. He was a keen dipterist and has probably done as much as any man to encourage the study of flies through the help and encouragement he gave to young dipterists.

Major General A. L. Ransome, C.B., D.S.O., M.C., joined the Society in 1946, he was essentially a butterfly collector who specialised in the 'blues' of which he had a fine collection including some outstanding aberrations.

Mr. H. Ray joined the Society in 1946; he lived in Hampshire and was a keen collector of butterflies.

Mr. O. T. Rich died at an early age, he was little known in this country, but in Denmark, where he lived, he was one of the leading lepidopterists.

Mr. Harold Symes M.A. (OXON), who joined the Society in 1950, lived in Bournemouth and was an outstanding naturalist, full of wisdom, knowledge and observation, and with the great gift of being able to communicate his conclusions to others. His articles, mostly in the *Entomologist's Record*, on rearing larvae, are some of the most helpful ever written.

You have heard the reports of the Council, of the treasurer, and of the other officers, which give a summary of the year's activities, and there is little more for me to say on these matters.

There is one point which causes me some concern and that is our membership which has only increased by two, though we had 46 new members. It is encouraging

that a high proportion of the new members are young; this is vital and the strength and future of our Society depends entirely upon attracting and keeping a steady flow of young entomologists. This also puts a high responsibility upon your Council to ensure that we offer lectures and field meetings which the younger members want.

In two years' time the Society will be celebrating its centenary and we are already planning for this event. At present it is still in the exploratory stage, we have asked members for suggestions and also for contributions and promises of donations, so that we can have some idea of what we can afford—it is no good planning a trip to the moon if we can only afford a visit to Southend pier. To those who have already contributed and sent Bankers Orders, I offer the sincere thanks of the Council, and to those who have not yet made up their minds I hope they will let us know how much they will be able to contribute when the time comes, so that we can plan accordingly.

You have heard of the Professor Hering Memorial Research Fund and I think that it is a great honour and tribute to this Society that we should have been chosen to administer this fund. As soon as the final details have been agreed, members will, of course, be fully informed and it is likely that a Special Meeting will have to be convened to approve them, and possibly to amend the rules of the Society to take account of this fund.

One of the pleasant features of the President's Annual Address is that it gives him an opportunity to express to the officers and council of our Society not only your appreciation and thanks, but his own, and I can assure you it is only when you become President that you realise how much is owed to our officers. Mr. D. A. Odd in his first year as secretary has attended to our many and varied wants with the efficiency and zest that you would expect; Mr. R. F. Bretherton, our treasurer, has looked after our finances with great skill, and I am sure that he will be the first to acknowledge the help given by Mr. F. T. Vallins in the essential but thankless task of collecting and sometimes chasing subscriptions, and my very personal thanks to Mr. Vallins for acting as secretary at Ordinary meetings and doing his utmost to keep me on the rails.

With the regrettable departure of Mr. Wiltshire to live in France, we were indeed fortunate that Mr. F. D. Buck agreed to resume as Editor and he has done a splendid job in getting us up-to-date with our publications.

The hours spent by our curator, Mr. A. E. Gardner, in arranging our collections and incorporating new material are phenomenal and we all owe him and Mr. L. Christie a great debt of gratitude.

Under Mr. S. A. Williams' able care the library continues to expand and flourish. The standard set for indoor meetings has always been high, but I think that in 1969 we have been particularly fortunate in having some outstanding talks and we are indeed grateful to Mr. David Carter and also to our lanternists, Mr. M. Shaffer and Mr. L. Christie, without whom many of our talks would lose much of their value.

Mr. G. Prior arranged an attractive and varied series of field meetings which were much enjoyed; I would remind members that it would help him a lot if they will come forward with ideas for field meetings and, still more important, offers to lead them.

The special amenities for those members attending ordinary meetings of the Society include the refreshments provided by Mrs. Helen Howarth and her husband—it is hard work and a true labour of love which is very much appreciated, as is also the generous donation to the Centenary Fund.

**MICROLEPIDOPTERA ADDED TO THE BRITISH LIST SINCE
L. T. FORD'S REVIEW**

Now I come to the hardest part of the President's year of office, on what subject should I address you? I have no scientific knowledge, little practical experience and cannot even take a photograph, so I have decided to carry on where that very distinguished microlepidopterist, the late Mr. L. T. Ford, left off. When he delivered his Presidential Address (1949, *Proc. S. Lond. ent. nat. Hist. Soc.* 1947-8:48-58), he reviewed the microlepidoptera which had been added to the British List since the publication of Meyrick's *Revised Handbook of British Lepidoptera* in 1928. To-night I propose to consider briefly those species of microlepidoptera which have been added to the British List since Ford's review.

It is of interest that in the 20 years ending in 1947, Ford found some 68 species to discuss, tonight I am considering 109.

I have taken as the datum line Heslop's *Check-list of the British Lepidoptera* published in 1947 and for the genera to which the species belong I have followed the order in which they appear in this check list.

Synclita oblitteralis Walker., *Ent. Gaz.*, 19:155 (1968). Examples of this species, which was originally endemic to the U.S.A., were found in the Enfield area, where it had evidently been imported in pond weed from the United States, though it is not known from which area.

Parapoynx obscuralis Grote., *Ent. Gaz.*, 19:107 (1968). This species is also endemic to the U.S.A. and specimens were bred from larvae imported in pond weed from Maryland in 1967 by a grower in Hemel Hempstead.

Maruca testulalis Geyer., *Ent. Rec.*, 80:242 (1968). Two specimens were bred in 1967 at the East Malling Research Station from larvae feeding in pods of French beans, part of a consignment received from Malawi, Africa.

Hellula undalis F., *Ent. Gaz.*, 19:111 (1968). A female specimen was captured at light on 28.ix.67 by the late Mr. E. J. Hare. It has a wide distribution in Europe, Africa, parts of Asia, and islands in the Indian and Pacific Oceans.

Hymenia recurvalis F., *Ent. Gaz.*, 3:57 (1952). This pretty pyrale was first taken by the late Robin Mere at Haslemere on 5.ix.51 and another example was taken later that year at Swanage. Its range is given as Palaearctic, Asia from Syria to Japan, the whole Oriental and Australasian regions.

Pachyzancla aegrotalis Zell., B. P. Beirne, *British Pyralid and Plume Moths*, p. 136. This species was recorded by Gregson as having been captured near Bolton, Lancs., in 1889.

Perinephela perlucidalis Hübn., *Ent. Gaz.*, 8:162 (1957). This is another pyrale whose first capture was recorded by Robin Mere; he took it at Woodwalton Fen in June 1951 and at first thought it was a worn *Opisotrys fuscalis* Schiff., it was not until 1956 that it was identified as *P. perlucidalis*. The moth is evidently well established in Woodwalton Fen and has also been taken in Kent.

Pyralis manihotalis Guen., B. P. Beirne, *British Pyralid and Plume Moths*, p. 116. Larvae of this species which may be a form of *P. pictalis* Curt. were found feeding on Indian skins, bones and hides in Dundee in 1943.

Aglossa ocellalis Led., B. P. Beirne, *British Pyralid and Plume Moths*, p. 113. A specimen was found in 1943 in Glasgow in a cargo of West African palm kernel.

Nephopteryx albicilla H.-S., *Ent. Gaz.*, 16:13 (1965). This moth was taken in June 1964 near Tintern, Monmouthshire. It occurs in Germany, France and Switzerland when the food plant is *Salix*, lime, hazel and alder also being cited.

It may well be breeding in the woods near Tintern, possibly feeding on *Tilia cordata* Mill. (Small-leaved Lime). The male is readily distinguishable from *Laodamia fusca* Haw. by the colour of the head and scapes, those of *fusca* being black and those of *albicilla* white.

Trachonitis cristella Hübn., B. P. Beirne, *British Pyralid and Plume Moths*, p. 98. There is some doubt about this species: according to Banks, Barrett's *Acrobasis rubrotibiella* F.R. from Portsmouth, Hants, was *T. cristella*, but the specimen may have been of Continental origin.

Mussidia nigrivenella Rag., B. P. Beirne, *British Pyralid and Plume Moths*, p. 103. An example of this African species was found in a London warehouse in 1930. The larva feeds on cereals and cacao beans.

Euzophera bigella Zell., *Ent. Gaz.*, **19**:155 (1968). A larva was found feeding on an Italian peach in Edinburgh in 1955 by Mr. E. C. Pelham-Clinton and was successfully reared. The type locality is in Italy and it is also recorded from France, Belgium and Turkestan.

Euzophera osseatella Treits., *Ent. Gaz.*, **14**:100 (1963). A moth which had been bred from a larva found in a consignment of Egyptian potatoes at Grangemouth, Scotland, in June 1962, was identified as *E. osseatella* by Mr. P. E. S. Whalley.

Lamoria anella Schiff., I can find no record of a British example of this moth. *Crambus leucoschalis* Hamps., *Entomologist*, **92**:176 (1959). This moth was taken at Plymouth in 1920, but it was not until 1959 that it was identified. The insect is a native of the drier parts of Africa and little is known of its life history.

Catoptria osthederi de Lattin, *Ent. Rec.*, **75**:141 (1963), *Ent. Gaz.*, **18**:91 (1967). A specimen captured in Kent in July 1962 by Dr. P. J. Roche proved to be *osthederi*, indistinguishable from *C. permuatella* H.-S. except by the examination of the genitalia. It is fairly widely distributed on the Continent.

Catoptria speculalis Hübn., *Ent. Gaz.*, **18**:94 (1967). On examining a series of *C. permuatella* H.-S. in the British Museum (Nat. Hist.) one specimen labelled 'W. Reid, Perth, July 1890' proved to be *C. speculalis*, a species recorded from the Alps, the Apennines, Jugoslavia and Transylvania.

Ancylolomia tentaculella Hübn., *Ent. Rec.*, **64**:273 (1952); **65**:148 (1953). This moth was taken at Dungeness, Kent, in July 1935, and remained unidentified until after another example had been taken by the late Canon T. G. Edwards and Mr. S. Wakely at Dymchurch, Kent, in July 1952. It is a south European species and little seems to be known of it.

Crombrugghia laetus Zell., *Ent. Rec.*, **75**:11 (1963). This plume was first taken by Mr. G. H. Youden near Ashford, Kent, in September 1961 and a second specimen by Mr. H. N. Michaelis in the Great Orme area in 1968. There has, in the past, been some confusion between *C. laetus* and *C. distans* Zell., but it appears that other specimens in British collections thought to be *C. laetus* were in fact *C. distans*. It is likely that both these moths were migrants.

Pterophorus icterodactylus Mann., *Ent. Gaz.*, **4**:135 (1953); **6**:124 (1955); **16**:124 (1965); **19**:82 (1968). This plume was first taken by the British Museum (Nat. Hist.) expedition to the Burren in 1952 where it is well established. It has also been recorded from Cornwall.

Oidematophorus bowesi Whalley, *Ent. Gaz.*, **11**:29 (1960). This moth was taken by the late Mr. A. J. L. Bowes at Ashford in Kent, but it was not discovered until 1960 when his collection was examined in the British Museum (Nat. Hist.) by Mr. P. E. S. Whalley. It is well established in Kent where it feeds on Golden Rod.

Eugnosta lathoniana Hübn. This species seems to have crept into the British List;

- it was mentioned by Stephens but there is no authentic British specimen.
- Homona menciana* Walker, *Entomologist*, 97:275 (1964). Three moths were reared from larvae and pupae found on Camellia plants imported from Japan in 1964. This insect is recorded as a pest of tea in the Far East.
- Ptychollmoides aeriferana* H.-S., *Entomologist*, 85:170 (1952). This was first taken at Westwell, near Ashford, Kent, by the late Dr. E. Scott at the end of July 1951. The larvae feed on larch and it is described as an alpine species in France. It is resident here and has spread to other localities in the south.
- Amelia unitana* Hübn., *Ent. Gaz.*, 15:75 (1964); 16:16 (1965). Two specimens taken in the Burren in June 1961 proved to be *A. unitana*; it is closely related to *A. paleana* and examination of a long series in the Museum collection showed a number of specimens from Morpeth, Northumberland. Mr. Michaelis also took a number on Malham Tarn, Yorks., in July 1956.
- Adoxophyes orana* F. R., *Ent. mon. Mag.*, 87:259; *Entomologist*, 85:1 (1952); 86:264 (1953); *Ent. Rec.*, 81:95 (1969). This moth was first recorded in England at the East Malling Research Station in 1950. Since then it has been recorded from Camberwell, Blackheath, Westcliff-on-Sea, Bromley and last year from Walberswick in Suffolk. Abroad it is a considerable pest of fruit trees in Holland, Belgium and parts of France.
- Cnephasia gueneana* Dup., *Ent. Gaz.*, 12:18 (1961). A specimen was bred in April 1960 by Lt.-Col. W. B. L. Manley from a larva found in some anemones and jonquils imported from the south of France.
- Epichoristodes acerbella* Walker, *Ent. Gaz.*, 20:72 (1969). This moth was found in an Edinburgh house freshly emerged from a flower of Chincherinchee sent from South Africa.
- Acleris abietana* Hübn., *Ent. Rec.*, 79:151 (1967). This moth, which has a wide continental distribution, was taken by Mr. D. L. Coates on 11.x.65 in his mercury vapour light trap at Aberfoyle, Perthshire; as he took another example in the following spring it is possible that this species is resident in that area.
- Laspeyresia pactolana* Zell., *Ent. Rec.*, 78:134, 167 (1966). This moth was taken at mercury vapour light in Alice Holt Forest, Hants, by Mr. A. E. Sadler on 12.vi.65. It is a well-known species on the Continent, where the larvae are said to feed on the bark of *Picea abies* (L.) Kurst. (Spruce).
- Grapholita prunivorana* Rag., *Ent. Gaz.*, 10:62 (1959); *Ent. Rec.*, 70:70 (1958). This species first came to notice when it was taken by the late Canon Edwards and Mr. Wakely in June 1957 at Dungeness. Previous records from Kent in 1922 had been misidentified. The larva feeds in the fruits of *Prunus* and *Cerastus*, but so far as is known it has not yet been found in this country.
- Pammene agnotana* Reb., *Ent. Rec.*, 75:13 (1963). This small dark tortricid was first taken by Mr. F. M. Struthers at Newlands Corner, Surrey, in April 1961. There appears to be no other British record.
- Pammene aurantiana* Staud., *Ent. Gaz.*, 9:60 (1958), *Ent. Rec.*, 69:205, 282, 287 (1957); 70:28 (1958); 72:34 (1960). Two specimens were taken at Dover in July 1944, but were not identified until 1957. It is locally plentiful in Kent and Surrey and has been bred from larvae in the seeds of *Acer pseudoplatanus* L. (Sycamore).
- Pammene herrichiana* Hein. (*nimbana* H.-S.). This is a species which has been mixed up with *P. fasciana* L. (*juliana* Curt.). and has only recently been separated by Dr. Nikolaus Obraztsov.
- Rhyacionia hastana* Hübn. Another moth which has crept into the British list of which there is no authentic British record.
- Ancylis geminana* Don., *Ent. Gaz.*, 10:73 (1959). This is a synonym of *A.*

biarcuana Steph., now separated from *A. inornatana* H.-S., synonym *subarcuana* Dougl., and *diminutana* Haw.; like *diminutana* the larva feeds on sallow and has a wide range extending to the west of Ireland.

Apotomis infida Hein., *Ent. Gaz.*, 14:39 (1963). This moth was detected by Dr. J. D. Bradley in 1963 from material in the British Museum (Nat. Hist.) collections: it had been taken in Perthshire in 1919. The insect is superficially very similar to *A. semifasciana* Haw.

Argolamprotes micella Schiff., *Proc. S. Lond. ent. nat. Hist. Soc.*, 1965(2):42. One taken by Mr. A. Kennard at mercury vapour light at Ide, Devon, 17.vii.62, appears to be the only occurrence of this species in Britain. It is fairly widespread on the Continent where the larva is said to feed in May and June on *Rubus* spp. principally raspberry, and probably feeds on the pith.

Monochroa hornigi Staud., *Proc. S. Lond. ent. nat. Hist. Soc.*, 1963(2):59, 70, pl. viii. A comparatively rare and local species occurring in Central Europe and associated with *Polygonum* spp. (knotgrass), a single specimen of which, the only record for Britain, occurred in a mercury vapour light trap at Buckingham Palace on 17.vi.63.

Recurvaria piceaella Kearfott, *A.E.S. Bull.*, 25:88. This moth was taken at light by Mr. P. A. Goddard on Stanmore Common on 20.vii.65. It is a North American species but may well be established on garden conifers in this country. It was first taken in 1952 by Mr. W. E. Minnion and a single specimen was also taken by Mr. A. A. Allen on Blackheath.

Scrobipalpa clintoni Povolny, *Ent. Gaz.*, 19:113 (1968). This is a new species, the pupae of which were first detected by Mr. R. R. Askew in the stems of *Rumex crispus* L. (Curled Dock) growing in Argyllshire in 1966.

Scrobipalpa murinella H.-S., *Ent. Gaz.*, 15:79 (1964). Five examples of this species were collected amongst patches of *Antennaria dioica* (L.) Gaertn. (Cat's Ear) in the northern part of the Burren in the early summer of 1962; subsequently moths were bred from larvae found in September mining the leaves and stems. The species occurs locally on the Continent.

Scrobipalpa psilella H.-S., *Ent. Gaz.*, 16:9 (1965). This moth had been mis-identified, the first, taken on Dartford Heath, Kent, in 1850 was determined as *S. artemisiella* Treits.; the second, taken at Benfleet, Essex, in 1897, as *S. instabilella* Dougl.; and another on Erith Marsh, Kent, in 1926, as *S. acuminatella* Sirc.

Nothris congressariella Bruand, *Ent. Gaz.*, 9:126 (1958); *Ent. Rec.*, 71:35 (1959). This moth was taken on Tresco, Scilly Isles, in May 1957 by the late Mr. R. M. Mere; it is found in France, especially in the south, and on the Atlantic seaboard. It is undoubtedly a resident on Tresco.

Stomopteryx polychromella Reb., *Ent. Gaz.*, 4:37 (1953). This moth was found by the late Mr. L. T. Ford near Bexley station, Kent. A species widely distributed in North Africa; this specimen was no doubt accidentally imported, possibly as a pupa with esparto grass.

Anacampsis blattariella Hüb., *Ent. Gaz.*, 12:115 (1961). Dr. N. Sattler while studying the synonymy of *A. populella* Clerck found that Hübner (1796) under the name *blattariella* figured the species now generally known as *betulinella* Vári. The older name has therefore been re-established.

Anarsia lineatella Zell., *Ent. Gaz.*, 10:57 (1959). This was bred by Mr. R. W. J. Uffen from a larva found in an imported apricot in August 1957. It is stated to be rather common in France, and occurs throughout temperate and southern Europe.

Oegoconia deauratella H.-S., *Ent. Rec.*, 78:243 (1966). This species was separated

from *O. quadripuncta* Haw., by Mr. P. A. Goddard in 1965. It is probably fairly widely distributed, but I think only in the south and east. I have taken it at Thorpeness.

Brachmia dimidiella Schiff., another species of which there is no authentic British record.

Pleota aristella L., recorded as an uncertain British species by Stephens in 1829. There is no authentic British record.

Tubuliferola josephinae Toll, *A. E. S. Bull.*, 25:88 (1966). This moth was taken in daylight on 19.vii.65 by Mr. P. A. Goddard on Stanmore Common. This species is closely allied to *T. flavifrontella* Hübn., and it was only in 1956 that the two were separated by Toll. Dr. J. D. Bradley tells me that there are specimens in the Bankes collection taken at Aviemore in June and July 1908.

Sorhagenia rhamniella Zell., *Ent. Gaz.*, 14:41 (1963); *Ent. Rec.*, 78:11 (1966), 81:20 (1969). This moth was first discovered in Wicken Fen by Lt.-Col. A. M. Emmet in August 1965; in 1968 he was able to find the larval spinnings in the terminal leaves of *Frangula alnus* Mill. (Alder Buckthorn) in mid-June. The species previously known as *S. rhamniella* was in fact *S. lophyrella* Dougl.

Sorhagenia janiszewskae Reidl., *Ent. Gaz.*, 14:43 (1963); *Ent. Rec.*, 78:9 (1966).

This moth was taken by Dr. Bradley and Mr. Arthur Smith in Ashdown Forest in September 1962. In 1965, Mr. S. Wakely was successful in finding larval spinnings on *Frangula alnus* Mill, and bred through a series as did Mr. J. M. Chalmers-Hunt from larvae taken in Blean Woods, Kent.

Sorhagenia lophyrella Dougl., *Ent. Gaz.*, 14:42 (1963). Both this and the previous species have been mixed up in British collections under *S. rhamniella*. The moth seems to be fairly widely distributed, Witherslack, Saffron Walden, Kent, Norfolk and Surrey.

Mompha subdivisella Bradley, *Ent. Gaz.*, 2:173 (1951). Though this moth was taken in 1894, it was not until 1950 that Dr. Bradley, examining the European species belonging to the genus *Mompha*, described it as a new species.

Mompha nodicolella Fuchs., *Ent. Rec.*, 63:49 (1951). The moth, bred on 5.x.50 by Mr. Wakely, proved to be the first authentic British specimen. The previous record from Westerham, Kent, proving to be *M. subbistrigella* Haw.

Blastobasis phycidella Zell., *Ent. Rec.*, 61:113 (1949). This moth was taken by the late Mr. W. Fassnidge at Southampton in April 1930, but it was not identified until 1949 when Mr. S. N. A. Jacobs discovered the mistake. There is no other known British occurrence.

Depressaria silesiaca Hein., *Proc. Brit. ent. nat. Hist. Soc.*, 1969(2):39. Discovered as new to Britain by Mr. E. C. Pelham-Clinton, who took larvae on *Achillea millefolium* L. (Yarrow) at Aviemore, Inv., and reared the insect.

Agonopteryx prostratella Constant, *Ent. Rec.*, 71:27 (1959). This species was first taken by Mr. R. Fairclough at light in Ashdown Forest in August 1957.

Elachista exigua Frey, *Ent. Gaz.*, 3:189 (1952). This moth was taken in the Burren in 1951 and again in the Scilly Isles in June 1957. It does not seem to have been known outside Switzerland, and is closely related to *E. stabilella* Frey. and *E. nigrella* Haw.

Elachista adscitella Staint., *Ent. Gaz.*, 14:156 (1963). This name had been used as a synonym of *E. mergerella* Staint., and has now been shown to be a distinct species.

Elachista unifasciella Haw., *Ent. Gaz.* 14:155 (1963). Like the last species has also been used as a synonym for *E. mergerella* and has now been shown as a distinct species.

Mendesia farinella Thunb., *Microscope*, Jan. 1950. The single known British

specimen is in the Hawkshaw collection bearing the data label 'Dover, 27.v.97' was misidentified as *E. argentella* Clerck, and was not correctly identified until 1950.

Ocnerostoma friesei Svens., *Opuscula Entomologica*, 31:196. This species has been separated from *O. pinariella* Zell. by I. Svensson. We await with interest a paper which is being prepared by Mr. Chalmers-Hunt on its distribution in Great Britain.

Coleophora hornigi Toll (*C. albicornuella* Bradley), *Ent. Gaz.*, 7:148 (1956). This widespread species was erroneously thought by all British authors from Stainton to Ford to have been described by Zeller under the name *C. paripennella*. It is closely allied to *C. ahenella* Hein. and resembles it in size and colouration; they may be readily separated by the antennae which in *ahenella* is white with a sharply defined fuscous ring on each segment from base to apex.

Coleophora politella Scott, *Ent. Gaz.*, 13:179 (1962). Scott's collection is said to have been incorporated into that of Walsingham via Douglas, but no specimens have been found labelled as this species. Toll, Materialy do Fizjograffi nr. 32 Eupistidae Polski, p. 89 (1952) reinstated *politella* as a good species and the larval cases figured by Toll fit closely to the original description given by Scott (1861). A. Sich, *Ent. Rec.* 26:248-9 (1914) and H. J. Turner bred moths varying from ochreous to fuscous from both nut and alder. Sich concluded that there was no significance in the colour differences noted by Scott in describing *politella* and Stainton in describing *bicolorella*, which latter has long been known under the prior name *binderella* Koller. Toll figured differences in the genitalia which would be ascribed to variation or to differences in mounting. *Politella* is therefore most likely not a distinct species.

Coleophora alnifoliae Barasch. Mr. R. W. J. Uffen's original discovery of this species, and the next, remains unpublished because of doubt of their distinctness. This species begins feeding on birch and alder in autumn and feeds up in the spring, producing moths in July-August or overwintering again. Frequent in south-east England from Norfolk to Hampshire and doubtless beyond.

Coleophora milvipennis Zell. This is a relatively common species occurring in the south of England from Kent to Somerset (it may even be more widespread). The larvae feed in a bivalved case on birch in the autumn. Formerly it was confused with *C. limosipennella* Dup., but the case of *milvipennis* is more slender and makes an angle instead of being parallel with the surface of the leaf.

Coleophora clypeiferella Hofm., *Ent. Rec.*, 66:272 (1954); 70:28 (1958); 72:144 (1960). This moth was recorded at Camberwell by Mr. Wakely in August 1953. On the Continent it is stated to feed on the seeds of *Chenopodium*. It has also been taken in South London, Dover and larvae found and reared from Mortlake, Surrey.

Coleophora serpylletorum Hering., *Ent. Rec.*, 81:2 (1969); *Proc. S. Lond. ent. nat. Hist. Soc.*, 1964:20 and 1967:71 (plate II). This moth was found by the late Robin Mere and Messrs. Pelham-Clinton and Michaelis on the Great Orme in 1964. The larva feeds on *Thymus drucei* Ronn. (Common Wild Thyme), and the erect dark brown case, built from the leaves of Thyme, is usually found on the underside of the leaf towards the tip of a spray where a few brown leaves may indicate the presence. The larva ceases to feed about mid-June.

Coleophora lassella Staud., *Ent. Gaz.*, 3:190 (1952). This moth was collected in the Burren in 1951, from West Cork in 1952, from County Kerry in May 1962 and also from Jersey and Southampton. Dr. Bradley has shown *C. gotlandica*

Benander to be a synonym of *lassella* (*teidensis* Walsingham) which throws an interesting light on its distribution, previously it had been known from only three examples from Teneriffe, one from Belgium and one from Gotland.

Coleophora trochilella Dup., *Ent. Gaz.*, 11:34 (1960); 13:184 (1962); 17:221 (1966). Specimens under the name *troglodytella* Dup. in Ford's collection have been examined by Dr. Bradley and have proved to belong to *trochilella*, one of the 'troglodytella' group making silken cases and blotching the leaves of many Compositae. Readily identifiable only by the genitalia.

Coleophora derivatella Zell. *Ent. Gaz.*, 11:31 (1960). This species was bred from larval cases on *Eupatorium* collected in the Burren by Dr. Bradley in July 1952. It was later found to be a synonym of the prior *C. troglodytella* Dup.

Coleophora ramosella Zell., *Ent. Gaz.*, 11:32 (1960). This moth was taken at light in the Burren in July 1952. The larvae feed on *Solidago virgaurea* L. (Golden Rod) in the spring, yielding imagines in June and July.

Coleophora peribenanderi Toll, *Ent. Gaz.*, 11:36 (1960). Specimens in this country have been misidentified as *C. therinella* Tengst. and should be *peribenanderi*, which is the common species feeding on thistles in the autumn. Little is known of the true *therinella* here, but the species has been taken in Norfolk and Kent and Mr. Uffen associated his example with *Eupatorium*.

Coleophora adspersella Benander, *Entomologist*, 91:125 (1958); *Ent. Rec.*, 81:4 (1969). This moth was taken at light by Col. C. W. Mackworth-Praed on 28.vi.57 at Burley in the New Forest. The larva feeds on *Atriplex* and *Chenopodium* and the moth has a wide distribution, extending as far north as Wales. It seems to prefer coastal localities but is also found inland.

Coleophora sternipennella Zell., *Entomologist*, 92:120 (1959); *Ent. Rec.*, 72:136 (1960); 81:5 (1969). This moth was bred in July 1955 from larvae on *Chenopodium album* L. collected by Mr. Wakely in October 1954 from Camberwell. It is widely distributed in the London area and has also been taken from salt marshes in North Wales on *Atriplex littoralis* L.

Coleophora versrella Zell., *Entomologist*, 92:27 (1959); *Ent. Gaz.*, 11:31 (1960); *Ent. Rec.*, 81:5 (1969). Discovered on Chesil Beach, Dorset, by Dr. Bradley and Mr. D. S. Fletcher in 1958. It feeds on *Atriplex littoralis* L. (Grass-leaved Orache) on salt marshes and *Chenopodium* on waste ground near the coast from North Wales to the Thames and Central London, also the Breck.

Coleophora cerasivorella Packard is the species figured by Pierce and Metcalfe as *C. nigricella* Steph. It blotsches the leaves of hawthorn and is common.

Coleophora coracipennella Hübner is the true *nigricella* Stevens, Dr. Bradley infers by studying British Museum material, but Mr. Uffen has never had it submitted to him for identification, so it may be less common now than it was 100 years ago.

Coleophora pappiferella Hofm., *Ent. Gaz.*, 13:171 (1962). This insect was taken by Dr. Bradley in the Burren in May 1961. The cases have been found there in July on *Antennaria dioica* (L.) Gaertn. (Cat's Foot).

Coleophora granulatella Zell. There is no authentic British record known of this species.

Coleophora arctostaphyli Meder (*C. marginatella* sensu Banks). Cases on *Arctostaphylos uva-ursi* Spreng (Bearberry) have recently been taken by Mr. Pelham-Clinton in Inverness-shire.

Coleophora squamosella Staint., *Ent. Gaz.*, 13:181 (1962). Dr. Bradley has shown *C. erigerella* Ford to be conspecific with *squamosella* under which earlier name it must now stand.

Acrocercops hofmanniella Schleich. This species has never been taken in Britain.

*

Stainton figured this moth in his *Natural History of the Tineina* 8:Plate V., fig. 3, in mistake for *A. imperialella* Mann. He called attention to the mistake in the *Entomologist's Annual* for 1878, pp. 147-9.

Parornix leucostola Pelham-Clinton, *Ent. Gaz.*, 15:51 (1964); 18:69 (1967). Seven examples of this species were collected by Mr. Pelham-Clinton in the Invernaive Nature Reserve in Sutherland in June 1963. A subsequent visit for larvae showed that *Dryas octopetala* L. (White Dryas) is the foodplant.

Parornix alpicola Wocke, *Ent. Gaz.*, 18:69 (1967). Larvae of this species were taken by Dr. Bradley and Mr. Pelham-Clinton at the Invernaive Nature Reserve from *Dryas octopetala* L. (White Dryas) in August 1964; the species is very similar to *P. leucostola*.

Bucculatrix capreella Krog. (*merei* Pelham-Clinton), *Ent. Gaz.*, 18:155 (1967). This species was discovered in September 1966 when Mr. G. E. Woodroffe, who was collecting with Mr. Pelham-Clinton, knocked a pair out of Alder near Aviemore, Inv. At first they were thought to be a new species and were named *merei* in honour of our late President, Mr. Robin Mere, but this name is now a synonym of *capreella*.

Tinea columbariella Wocke, *Entomologist*, 83:169 (1950). This moth was first discovered in this country when Mr. Woodroffe and Mr. B. J. Southgate bred considerable numbers from larvae found in the nests of house sparrows in 1950.

Stigmella pseudoplatanella Skala., *Ent. Rec.*, 74:11 (1962). The mines were found by Mr. Wakely in the Mickleham area in September 1961 on *Acer pseudoplatanus* L. (Sycamore). At this time the species was known to occur only in Germany and eastern Czechoslovakia, but has since been found in France.

Stigmella samiatella Zell., *Ent. mon. Mag.*, 88:286 (1952). Mines were taken by the late Mr. L. Parmenter at Box Hill on 21.ix.52, it has also been found in Hants, Dorset and Kent.

Stigmella nanivora Petersen has been known from Perthshire for many years; it is probably a subspecies of *S. betulincola* Staint.

Stigmella fulvomacula Skala and *Stigmella ulmicola* Hering, *Ent. Gaz.*, 14:36 (1963). Mines of these elm feeding species were detected by Mr. R. H. Richens in 1963; both are fairly widely distributed in the south and east of England.

Stigmella ulmiphaga Preissecker, *Ent. Rec.*, 14:38 (1963), another elm feeder uncovered by Mr. Richens' researches from material found in Essex. It has also been taken at Bere Regis, Dorset, by Mr. S. C. S. Brown in 1969.

Stigmella ulmifoliae Hering, *Ent. Rec.*, 74:122 (1962); *Ent. Gaz.*, 14:37 (1963). Mines were taken by Mr. Jacobs in leaves of sucker elm bushes near Stratford-on-Avon in September 1950; it has also been found in Essex, Hants and Dorset.

Stigmella aceris Frey., *Ent. Rec.*, 74:41 (1963). Mines were taken in August 1949, on a well grown *Acer campestre* L. (Maple) at Malling, Kent, by Mr. Jacobs.

Stigmella aeneella Hein., *Ent. Rec.*, 76:23 (1964). The mines were first found by Mr. Brown in *Sorbus torminalis* (L.) Crantz (Wild Service Tree) and *Sorbus aria* agg. (White Beam) in 1953 in Dorset; while in 1961 he found further mines in apples in his garden in Bournemouth, it has since been taken in Kent, Lancashire and Oxford. This species has long been confused with *S. oxyacanthella* Staint., which feeds on hawthorn and is double brooded while *aeneella* feeds mainly on apple and is single brooded.

Stigmella vossensis Gron., *Ent. Rec.*, 74:193 (1962). Mines were found by Mr.

Pelham-Clinton in the Black Wood at Rannoch in 1958. The only other known locality is Voss in Norway. The mine is in *Betula pubescens* Erhr. (Brown Birch).

Stigmella crataegella Klim., mines on hawthorn in 1962 from Bournemouth were identified as this species by the late Mr. Carolsfeld-Krause.

Stigmella paradoxa Frey. (*nitidella* Hein.). Mines taken in July 1969 at Wicken Fen by Col. A. M. Emmet and have since been noted at several localities in Cambridgeshire, Essex and Kent, as well as in the Burren. The larva makes a blotch with a dark central patch of frass in the leaves of hawthorn.

Nepticula serella Staint., Ent. Gaz., 13:174 (1962). Recently removed from synonymy with *N. poterii* Staint., and reinstated in the British list as a good species. It has been taken in Ireland along the river Caher.

Nepticula oxysorbi Skala, mines taken in Bournemouth in 1962 and at Bromley, Kent, on *Sorbus aucuparia* L. (Rowan) in 1964 have been identified by the late Mr. Carolsfeld-Krause as *N. oxysorbi*.

Nepticula dryadella Hofm., Ent. Gaz., 17:164 (1966); 18:69 (1967). The moth has been bred from larval mines which are to be found plentifully on *Dryas octopetala* L. (White Dryas) in the Burren. Mr. Pelham-Clinton has also taken it in Sutherland.

Nepticula dulcella Hein., *N. fragariella* Heyd. and *N. gei* Wocke, are all probably subspecies of *N. aurella* Staint., but much more study on them is necessary.

Nepticula obliquella Hein., this species was thought by Ford to be a subspecies of *N. vimineticola* Frey., but it is a good species, the genitalia being quite different from both *vimineticola* and *salicis* Staint.; the mines are also different.

Dechtria turbidella H.-S., Ent. Gaz., 1:39 (1950). The late Mr. Ford took these moths on Stanmore Common: he named them *Nepticula marionella*, now proved to be a synonym for *D. turbidella*. In 1969, Col. Emmet found it at Wicken Fen; the larva mines the leaves of *Populus alba* L. (White Poplar).

Dechtria subapicella Staint., is a synonym for *D. argyropeza* Zell.

Trifurcula griseella Wolff, Ent. Gaz., 13:174 (1962). A single example was collected by Mr. Pelham-Clinton in the Burren in May 1961. The life history is unknown and the species is otherwise known only from a single specimen taken at Asserbo in the north of Sealand, Denmark.

I am greatly indebted to a number of people who have kindly helped me with this paper: Dr. J. D. Bradley, PH.D., F.R.E.S., Mr. S. C. S. Brown, F.D.S., F.R.E.S., Mr. J. M. Chalmers-Hunt, F.R.E.S., Colonel A. M. Emmet, M.B.E., T.D., Mr. S. N. A. Jacobs, F.R.E.S., Mr. H. N. Michaelis, Mr. M. Shaffer, Mr. R. W. J. Uffen, F.R.E.S., and Mr. S. Wakely.

COUNCIL'S REPORT FOR 1969

The Society has had another successful year and various items will be referred to in this report.

The membership at the end of December 1969 was 582, the same figure as at December 1968, the new membership is made up as follows: ordinary 13, country 19, junior 14, total 46. During the year 34 members resigned or had their membership cancelled through non-payment of subscriptions. Deaths amounted to 12, a high rate. A number of members were transferred from junior to either ordinary or country membership.

Mr. D. A. Odd has undertaken the heavy work of honorary secretary. It has, however, not been possible for him to attend Ordinary Meetings during the year, and thanks are extended to Mr. F. T. Vallins for acting as his deputy on these

occasions. Mr. E. P. Wiltshire had served as acting editor during most of 1968. He had to resign to take up a post abroad. The Society thanks him for his valuable work. In January, Mr. F. D. Buck was approached to take up the position again, and at the February meeting of the Council was elected, subject to his acceptance. We are pleased to say that he agreed to accept, and in consequence the publication of the Proceedings was speeded up, and we thank him for his valuable work.

Our new treasurer, Mr. R. F. Bretherton, has carried out his work with his usual efficiency, and the Society is grateful to him for accepting this position. During the year, a fine gift of £1,800 was received by the Society from Frau Hering in memory of her late husband, Prof. E. M. Hering. The money is to be used to set up a Trust Fund, the interest from which is to be used for the benefit of the following subjects: Leaf Miners, Diptera (particularly Tripetidae), Lepidoptera (particularly microlepidoptera), general Entomology. A special committee has been formed to administer the fund. Thanks have already been extended to Frau Hering on behalf of the Society for this generous gift. The indoor programme of 20 meetings was arranged by Mr. D. J. Carter and thanks are due to him for the very varied and interesting subjects. Most of the meetings were well attended.

The field meetings were organised by Mr. G. Prior and, unhappily, some were not as well attended as could have been expected. Thanks are given to the leaders, including those who arranged teas and who so kindly invited members to their homes.

The Annual Dinner was held at Flemings Hotel on Friday, 31st October, and was well attended by members and friends.

The Annual Exhibition on Saturday, 1st November, was again held in the Conversazione Room of the British Museum (Nat. Hist.) and attracted a large number of members and friends. There were fewer exhibits but the standard was high and our thanks are due to the Director of the Museum for the use of the room, to his staff for the assistance provided and to Mr. T. G. Howarth for making the necessary arrangements and who, with Mr. D. J. Carter, helped in attending to the photography of outstanding specimens.

The Society's Christmas card was designed by Mr. Alan Palmer, the subject being a Christmas rose, and the Society thank him for his excellent drawing. Miss K. Brookes has again been a hard worker in organising and arranging the sales in conjunction with other members and friends. Our thanks go out to all of them.

The serving of light refreshments at our ordinary meetings was again continued by Mrs. T. G. Howarth with the help of Mrs. D. Lewis of the Alpine Club, who has assisted us in many ways during the year.

All our members have received a letter of appeal for support for the Centenary Fund. Up to the present £352 has been donated or promised, and it is hoped that further contributions will be made during the next two years.

CURATOR'S REPORT

Nearly all the store boxes containing the A. M. Massee collection of British Coleoptera have been received from the British Museum (Nat. Hist.) and work has continued transferring the specimens to the 40-drawer cabinet. Mr. F. T. Vallins kindly offered to tackle the onerous task of re-arranging the Society's collection of microlepidoptera and to incorporate the F. J. Coulson and R. F. Richards material.

The collection is being accommodated in Hill units and the nomenclature follows the revised edition of Kloet and Hincks list of British Insects. All synonyms are included and we are indebted to the Rev. D. J. L. Agassiz for making photostat copies of the list available.

Considerable progress has been made already and we should be grateful for this valuable and practical help.

Work has also continued on the re-arrangement of the Hemiptera-Homoptera which it is hoped will be completed during 1970. It will then be possible to start work on our collections of Odonata, Neuroptera, Trichoptera and Orthoptera.

Mr. J. C. Felton has continued to work on the Hymenoptera, Mr. F. J. Chandler on the Diptera, and Mr. S. A. Williams on some of the more obscure genera of the Staphylinidae (Col.).

During the year Hill units have been purchased and two small cabinets which were surplus to our requirements have been sold.

One microscope has been placed on loan and it is pleasing to report that members continue to use the collections and facilities which are available.

The thanks of the Society are due to the following members for notable accessions: Mr. A. E. Gardner (Coleoptera), Mr. B. Goater (Lepidoptera), Mr. C. MacKechnie-Jarvis (Coleoptera), Mr. M. W. F. Tweedie (Lepidoptera), Mr. F. T. Vallins (Lepidoptera) and Mr. S. A. Williams (Coleoptera).

Although the Society's collection of British macrolepidoptera is very nearly complete, it is thought that members might like to help fill the few remaining gaps during the coming season. Insects required are as follows: *Colocasia coryli* L. ab. *melanotica* Haverk., *Luperina nickerlii* Freyer s.sp. *knilli* Boursin, *Trisateles emortualis* Schiff., *Thalera fimbrialis* Scop., *Scopula strigaria* Hübn., *Eupithecia phoeniceata* Ramb., *Amathes agathina* Dup., *Hydraecia hucherardi* Mab., *Nonagria neurica* Rueb., *N. dissoluta* Treits., *Arenostola pygmina* Haw., *A. fluxa* Hübn., *Oria musculosa* Hübn., *Lithophane leautieri* Boisd., *Cucullia gnaphalii* Hübn., *Heliothis maritima* Graslin, *Plusia gracilis* Lempke, *P. ni* Hübn., *Venusia cambrica* Curt., *Euphyia luctuata* Schiff., *Eupithecia valerianata* Hübn. and *E. palustraria* Doubl.

Mr. L. Christie, the assistant curator, has continued to render his usual valuable help with the task of repapering cabinet drawers.

LIBRARIAN'S REPORT

I am pleased to report another satisfactory year for the library in which a record number of books were borrowed and several important gifts were received. A much used section of the library is that containing the notebooks, and we are very pleased to receive from Mrs. L. Parmenter the notebooks belonging to her late husband, the eminent dipterist. These comprise several large parcels, which will be of great use to members when they have been catalogued.

Mrs. F. de la Mare presented a fine collection of lovely water colours, mainly lepidopterous larva, painted by her late husband. A small number were exhibited at the Annual Exhibition this year and it is hoped to show more next year.

Another plastic blind was purchased and again Mr. A. E. Gardner kindly agreed to fix it in position over the open shelves.

Most of the bound serial publications have been transferred from the bookcases to these shelves, and the vacant space filled with new books. Several duplicate copies of the *Entomologist* have been sold to a member to make room for new books.

The new firm of binders has returned eight volumes all of which were bound

to the Council's satisfaction, at a lower price and far quicker than the previous binders, whom we have used for many years.

Many new books were kindly presented by members, including a large number of reprints of scarce and important works donated by Mr. E. W. Classey. The following books were added to the library: Freud, Harde and Lohse, *Die Käfer Mitteleuropas*, Vol. 8; Hinton, H. E., *A Monograph of the Beetles Associated with Stored Products*, Vol. 1, purchased; M. Jee, *Guernsey's Natural History*, presented by Dr. J. L. Newton; Cornwell, P. B., *The Cockroach*, presented by F. D. Buck; Tweedie, M. W. F., *Pleasure from Insects*, presented by S. N. A. Jacobs; Pelley, R. H., *Pests of Coffee*, presented by S. N. A. Jacobs; McMillan, N. F., *British Shells*, presented by S. N. A. Jacobs; Burton, M., *Animal Partnerships*, presented by S. N. A. Jacobs; Chapman, R. F., *The Insects Structure and Function*, presented by S. N. A. Jacobs; Hammond, C. O., *Flies of the British Isles*, presented by the author; and the following, mostly reprints, all presented by E. W. Classey: Needham, J. G., Traver, J. R. and Yin-Chi Hsu, *The Biology of Mayflies*; Balduf, W. V., *The Bionomics of Entomophagous Coleoptera*; Baker, C. F., *Invertebrata Pacifica*; Pierce, F. N., Metcalf, J. and Bierne B. P., *Genitalia of British Lepidoptera*; in 7 vols.; Holt, A. V., *Why Not Eat Insects?*; McLachlan, R., *A Monographic Revision and Synopsis of the Trichoptera of the European Fauna*; Crowson, R. W., *A Natural Classification of the families of Coleoptera*; Haworth, A. H., *Prodromus Lepidopterorum Britannicorum*; Meyrick, E., *Exotic Microlepidoptera*, Vols. 1-5; *The Entomologist*, Vol. 1; Verrall, G. H., *British Flies*, Vol. 8; Baynes, E. S. A., *A Revised Catalogue of the Irish Macro-lepidoptera*; Lucca, C., *Birds of the Maltese Islands*; Curtis, W., *A Short History of the Brown-tail Moth*. A number of separates have also been gratefully received.

We continue to receive the usual publications.

I am grateful for the help given by the assistant librarians, Miss C. Wagner and Mr. R. M. Williams.

EDITOR'S REPORT

When your editor resumed office in April 1969 he was faced with a publication position that was almost 12 months in arrears and no 1967 index published. He is pleased to be able to report that by January this year publication is right up to date. This would have been completely impossible without the goodwill and willing co-operation of the Assistant Editors and Papers Panel. The pressure on them since April last has been such that the Society really should not expect and was something of an embarrassment to your editor who applied this pressure on your behalf. Since they responded so generously and were unstinting in their efforts it is to be hoped that we do not have to ask them to perform a similar rescue operation.

Our first task was to get the Haggett paper into the hands of the members and a concerted effort was made in this direction; it appeared in June. It consisted of 72 pages and 10 coloured plates. Copies were immediately sent to Mrs. Margaret Mere who expressed her satisfaction with the production and hoped we thought it all worth while. Your editor wrote to Mrs. Mere and conveyed the Society's thanks to her for providing the financial support which made publication of this extremely valuable work possible.

In view of the fact that the Society had now published 128 pages and the 10 coloured plates it was deemed sensible to close the year's publication and proceed immediately with that for the current year. Accordingly volume 2, part 1, was

put in hand, and this appeared in June containing 30 pages and four black and white plates. In this part we published an important new arachnid discovery, some hitherto unpublished information about the early stages of *Trisateles emortualis* Schiff., and some remarkable new information about fleas.

Part 2 followed in August with 40 pages, 6 black and white plates and two coloured plates of *Callimorpha jacobaeae* L. aberrations. For these two coloured plates the Society is indebted to Mr. S. N. A. Jacobs and *The Entomologist's Record* to whom we have had previous cause to be grateful.

In October, Part 3 appeared with 32 pages and 2 black and white plates, this part included a valuable paper by T. S. Robertson on 'Homoeosis and Related Phenomena in the Small Copper Butterfly'.

Part 4, dated December, was despatched to our Secretary very late in the month and he was therefore unable to despatch before January. This contained 32 pages, 1 black and white and 1 coloured plate. It included another very competent paper by Mr. F. V. L. Jarvis in his series on *Aricia*. This is the paper for which the coloured plate was printed and which was financially supported by a number of our members to whom the Society offers its grateful thanks. In this respect the Society was able to help Mr. Høegh Guldberg, a Danish lepidopterist and colleague of Mr. Jarvis, by printing him a supply of the coloured plates for use with a paper on a very closely allied aspect of the same species to be published in the *Natura Jutlandica* series. He was not only grateful for the Society's help but admired the quality of the plates, which to a large extent was due to the excellence of the original photography.

During the year we completed and despatched the 1967 and 1968 indexes. Thus we completed the year in a happy position having published a total of 206 pages, 13 coloured and 13 black and white plates, plus 28 pages of index.

TREASURER'S REPORT 1969

My predecessor, Mr. Wheeler, has asked me to point out certain minor typographical errors which crept into the printed version of the Accounts for 1968 (Proceedings, vol. 2, part 2, pages 49–51), which were adopted at the Annual General Meeting a year ago. In the Balance Sheet, left-hand column, 1967, line 7, a minus sign should be inserted before 19 10. In the Christmas Cards Account, fourth column, 1967, the first figures should read £73 4 4 (instead of £73 5 4); and in the fifth column, last line, the date should read 1968 instead of 1969. In the Treasurer's Report, on page 48, line 14, 'from' should replace 'for'; and in line 30, 'stocks' should be deleted. On page 52, line 4, the total should read '£150 19 2.'

The Accounts for 1969 have been approved by our auditors, Mr. A. G. Stoughton-Harris and Mr. J. L. Messenger, but, as usual, there has not been time to circulate copies before this meeting. I will therefore describe the salient points.

The total Balance Sheet shows a remarkable increase of some £1,836, to £6,996. The largest item of increase is the generous gift of £1,800 received in the last days of the year from the widow of the late Professor Hering to form the capital of a research fund in memory of her husband. This gift has come to the Society through the good offices of our member, Mr. K. A. Spencer. It is now for us to administer it wisely. Another welcome increase is in the Centenary Fund. Largely in response to the special appeal, donations during the year amounted to £252. These are now earning interest, and have brought the Fund up to £272; in addition, but not shown in the Balance Sheet, a further £80 may

be expected over the next three years from members' bankers orders. The Housing Fund has received some small donations and has earned £50 in interest: the balance now stands at £896. The Reserve Fund has been temporarily swollen to £834, largely because I have transferred to it the unused balance—£335, plus accumulated interest—£77—of Mrs. Mere's gift to help the publication of plates of the larvae of British Lepidoptera and the relevant text. Members received during the year a fine instalment of these in the 1968 Proceedings, Part 2. The remainder of the gift was not drawn upon for the 1969 Proceedings, but will be available to pay for further publications of them in 1970 and later.

Finally, the General Fund has been increased to £2,658 by an excess of income over expenditure for the year of £158. This looks better than it really is. The provision made by my predecessor in the 1968 Accounts for the cost of producing the 1968 Proceedings proved to be considerably more than was needed when the bills came to be paid in 1969; and some of this saving has been used to reduce the grant from General Income to the Publications Account in 1969. For 1969 alone there was a small excess of expenditure over income of about £30. On general working we are not at present quite paying our way, and, in a period of sharply rising costs, this is not good enough. The main trouble lies in the Publications Account. It cost some £830 to produce and distribute the four Parts for 1969 and, though we received welcome gifts of £75 towards the *Aricia* plate and useful receipts from sales, this is more than we can afford on a continuing basis.

The main item of decrease is in the liability to Sundry Creditors, which is much reduced because of a much smaller provision for bills not received before the end of the year for the Proceedings.

On the assets side, our investments were increased by the purchase of a further 165 Premier Investment Trust Ordinary shares for £250. Our investments are valued at cost at £3,493; their market value at the end of 1969 was some 20 per cent above this. Our Bank Savings Account stood at £2,927 at the end of the year; £1,800 of this is represented by Frau Hering's gift, and I have, on the advice of the Finance Committee, since invested this, together with a further £500. Our bank balance on current account increased during the year by £142, to £357. Sundry debtors also rose by £60 to £129. This was mainly due to a larger claim on the Inland Revenue for tax repayments, and to larger outstandings from sales of the Proceedings. The value of stocks of ties and Christmas Cards has been reduced by the policy adopted in 1968 of writing down progressively the remainder of purchases of these items made before 1968, and of excluding later purchases from valuation in the Accounts; it is now less than £90.

In the general Income and Expenditure Account, there has been a big reduction in secretarial and stationery expenses, thanks to the skill and energy of our Secretary, Mr. Odd. On the other hand, the Curator has spent more than usual—some £70—on cabinets; besides bringing immediate benefit, this is probably a good investment. On the income side, interest on investments and on bank savings account are well up, but subscriptions, necessarily the core of our resources, are slightly down, from £1,043 to £1,036, from a total membership which is practically unchanged.

The special accounts have had a mixed year. Of the Publications Account I have already spoken. The Annual Dinner made a loss of 7/-, which is about as close to balance as one can get! The Librarian made some judicious sales of unwanted periodicals, as well as receiving the usual income from entrance fees, and £20 was added to the balance of the Library Fund. The Ties Account shows a small loss, and there has been some difficulty in discovering just how many ties we hold! Christmas Cards, on the other hand, vigorously managed by Miss

The South London Entomological and Natural History Society Statement of Accounts

GENERAL INCOME AND EXPENDITURE ACCOUNT

	EXPENDITURE	1968	1969	1968	1969	1968	1969
286 0 0	Rent ..	..	286 0 0	1042 17 10	Subscriptions ..	..	1036 5 8
12 10 6	Insurance ..	..	12 15 9	108 5 3	Interest on Investments ..	..	200 10 11
150 19 2	Secretarial Expenses ..	..	34 18 2	71 4 4	Interest on Bank Savings Account ..	..	84 19 0
5 9 9	Editorial Expenses ..	..	5 10 5	— — —	Sale of Cabinet ..	..	5 10 0
13 2 8	Treasurer's and Assistant Treasurer's Expenses ..	..	16 13 7	25 0 0	Bequest ..	..	— — —
65 4 11	Stationery ..	..	80 13 5	5 6 10	Ties Account—profit ..	..	— — —
20 15 0	Subscriptions to Societies ..	..	16 15 0	— — —	Christmas Cards Account—profit ..	..	2 16 6
10 9 9	Lectures and Exhibitions ..	..	14 0 6	5 7 6	Annual Dinner—profit ..	..	— — —
— — —	Cabinets and Collections ..	..	73 19 4	— — —	— — —	..	— — —
25 2 10	Miscellaneous ..	..	— — —	— — —	— — —	..	— — —
496 18 9	Publications Account ..	..	— — —	470 13 7	— — —	..	— — —
— — —	Ties Account—Loss ..	..	— — —	4 14 0	— — —	..	— — —
59 1 7	Christmas Cards Account—loss ..	..	— — —	— — —	— — —	..	— — —
— — —	Annual Dinner—loss ..	..	— — —	— — —	— — —	..	— — —
6 14 6	Bank charges ..	..	— — —	— — —	— — —	..	— — —
40 0 0	Housing Fund—interest transferred ..	..	— — —	— — —	— — —	..	— — —
20 0 0	Reserve Fund—interest transferred ..	..	— — —	— — —	— — —	..	— — —
— — —	Centenary Fund—interest transferred ..	..	— — —	— — —	— — —	..	— — —
£1212 9 5			£1172 0 9		£1317 15 9		£1330 2 1
105 6 4	Excess of Income over Expenditure ..	158 1 4					
£1317 15 9		£1330 2 1					

We certify that the Balance Sheet and the General Income & Expenditure Account are in accordance with the books and vouchers presented to us.

J. L. MESSENGER

A. G. STOUGHTON-HARRIS, F.C.A., Chartered Accountant.

R. F. BRETHERTON, Hon. Treasurer

The South London Entomological and Natural History Society Statement of Account

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PROC. S. LOND. ENT. NAT. HIST. SOC., 1970

BALANCE SHEET—31st DECEMBER, 1969

LIABILITIES						ASSETS					
1968 £ s. d.	1969 £ s. d.	1968 £ s. d.	1969 £ s. d.	1968 £ s. d.	1969 £ s. d.	1968 £ s. d.	1969 £ s. d.	1968 £ s. d.	1969 £ s. d.	1968 £ s. d.	1969 £ s. d.
<i>Special Funds—</i>											
<i>Housing</i>											
790 9 9											
7 17 6											
Balance at 1st January				838 7 3							
Add: donations				7 17 6							
Transfer from General											
Income & Expenditure											
Account .. .				50 0 0							
<i>Centenary—</i>											
14 3 0											
Balance at 1st January				14 13 0							
Add: donations				252 16 0							
Transfer from General											
Income & Expenditure											
Account .. .				5 0 0							
<i>Library</i>											
114 6 7											
-8 10 4											
Balance at 1st January				105 16 3							
Add: excess of income over											
expenditure for the year				20 3 3							
<i>Heiring Memorial Research Fund</i>											
Balance at 31st December											
1969 .. .											
<i>Reserve Fund</i>											
Balance at 1st January .. .				398 18 7							
Add: transfer from											
General Income &											
Expenditure Account .. .				99 10 0							
Account .. .				335 10 2							
52 2 0											
Subscriptions paid in											
advance .. .											
Sundry Creditors .. .											
<i>General Fund</i>											
Balance at 1st January .. .				2499 18 3							
Add: excess of income over											
expenditure for the year				158 1 4							
£5159 15 4											
£5159 15 4											
£6995 17 5											
£6995 17 5											

The value of the Society's Library, Collections, and stock of Christmas Cards and Ties purchased in 1968 and 1969 is not included.

Statement of Accounts

PUBLICATIONS ACCOUNT

1968			1969			1968			1969			
To	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
To Printing—												
Proceedings for 1969	680	0	0	631	10	0	38	14	3	119	16	10
Exhibition Report for 1968	—	—	—	28	12	0	1	18	0	—	—	—
Blocks—Calymorpha jacobsae L.	823	9	8	125	4	11	1000	0	0	75	0	0
Plates—Calymorpha jacobsae L.	—	—	—	25	0	0	—	—	—	526	9	10
Postage	34	1	4	46	3	2	496	18	9	470	13	7
Unused balance of donation, transferred to Reserve Fund ..	—	—	—	335	10	2				£1192	0	3
										£1192	0	3
										£1537	11	0

CHRISTMAS CARDS ACCOUNT

TIES ACCOUNT

Kathleen Brookes, did very well. Receipts from sales exceeded costs during the year by more than enough to cover the writing down of the pre-1968 stock, and the Account shows a small profit in place of last year's considerable loss.

To sum up, the Society's cash position is strong, and its investments and special funds are all doing well. But we do badly need a substantial rise in membership, and thus in subscriptions, to enable us to cover the full cost of publishing Proceedings on the scale we should like, as well as of running the day-to-day activities of the Society.

In conclusion, I should like to say how much I value the support I have had from Mr. Vallins as Assistant Treasurer. He has the particularly arduous task of looking after the subscriptions. I am also very grateful for the help given to me by Mr. Stoughton-Harris, despite an attack of the prevalent influenza, and by Mr. Messenger, in the production of these accounts. I have also had much good advice from Mr. J. A. C. Greenwood, Mr. J. L. Messenger and Mr. A. S. Wheeler as members of the Finance Committee.

OBITUARY

GEORGE HENRY WILSON CRUTTWELL 1891-1959

George Cruttwell was born at Denton, Norfolk, and was educated at Walton Lodge, Clevedon, and Bradfield College, Berkshire. In 1916, he married Miss Sybil Marguerite Burney, only daughter of Mr. Ernest le Seuer, Griffier of Jersey.

George started his career at Frome where he became articled to the firm of solicitors, Messrs. Cruttwell, Daniel & Collings. At the outbreak of the first World War he joined the 4th Battalion of the Berkshire Regiment, going to France in April 1915. In 1916 he was wounded at the Battle of the Somme and in the following year was appointed Captain-Instructor to No. 11 OCB.

After the war, in April 1919, he returned to his old firm at Frome and became a partner in the business. Apart from his work as a solicitor, he held numerous appointments in the town of Frome and was Deputy Coroner for S. E. Somerset from 1941-1945.

He had a keen interest in cricket, first playing for Frome in 1908. Between the wars he was instrumental in arranging for first-class county games to take place in the town, and both he and his wife played a large part in the organisation of the annual Cricket Week. After the war, when he had moved from Frome to Old Ford, he joined the St. Ivel Club, which he captained for a number of years.

George was an enthusiastic collector of Lepidoptera, an interest probably inherited from his father, Canon C. T. Cruttwell. Although for a long time he specialised in the butterflies, most particularly in the varieties of the blues, in later years he became more confined to the immediate locality of his delightful house and garden at Old Ford, where his mercury vapour moth trap brought him a number of rare and rewarding prizes.

He made regular annual visits to the exhibition of the Society and will be sadly missed by his many friends and associates in the entomological field.

D. E. NEWMAN

FIELD MEETING 1969

FAVERSHAM, KENT—19th July 1969

Leader: Mr. E. S. BRADFORD

The weather for this meeting, attended by four members, was very warm, with almost continuous sunshine. Conditions might have been better had the sun not been so bright and harsh. There was also a steady breeze most of the time, which was not conducive to entomology. Nevertheless, the day proved quite productive.

Several hours were spent along the Faversham Creek, where amongst the Lepidoptera taken, was a specimen of *Myelois cibrinella* Hübn. *Thymelicus lineola* Ochs. was seen as well as *T. sylvestris* Poda, and a number of *Plusia gamma* L. were disturbed. Other Lepidoptera seen were: *Pieris napi* L., *Maniola jurtina* L., *M. tithonus* L., *Vanessa atalanta* L., *Aglais urticae* L., *Cilix glaucata* Scop., *Ortholitha chenopodiata* L., *Haritala ruralis* Scop., *Crambus hortuellus* Hübn., *Agriphilia straminella* D. & S., *Anthophila fabriciana* L. and *Poraswammerdamia lutarea* Haw. Larval cases were found of *Fumaria casta* Pall.

The local beetle *Oxyporus rufus* L. was taken, and two interesting grasshoppers were noted, *Conocephalus dorsalis* Lat. and *Roeseliana roeselii* (Hagenbach).

After a break for refreshment it was decided to pay a visit to Oare Creek a few miles away. Here many of the things seen at Faversham were again met. In addition *Epiblema scutulana* Schiff. and *Parornix anglicella* Staint. were seen and numbers of *Crambus perlellus* Scop. were noted including form *warringtonellus* Staint. and some darkly marked specimens approaching that form.

Diptera reported from the saltmarsh were: *Liogaster splendida* Meig., one male, and *Hercostomus germanus* Weid. *Machaerium maritimae* Hal. was very numerous and a single *Pachygaster atra* Panz. was beaten from willow.

On the way back to Faversham a short stop was made to visit Ham Marshes, where a specimen of *Lomasplilis marginata* L. was taken. Also seen were several *Ebulea crocealis* Hübn., a specimen of *Pieris brassicae* L., and several coleophorid larval cases were taken from *Pulicaria dysenterica* L. Bernh. which proved later to be parasitized.

CHILTERN ESCARPMENT, OXFORSDHIRE—26th July 1969

Leader: Mr. G. PRIOR

Nine members and friends assembled for a meeting on a day that was fine and warm but not very sunny. In the morning the party worked in the old disused chalk pit on the north side of the Christmas Common to Watlington Road. It was a welcome sight to see so many *Lysandra coridon* Poda flying in an area where in previous years only two or three had been seen at this time. On the other hand *Melanargia galathea* L., *Aphantopus hyperanthus* L. and *Coenonympha pamphilus* L. were there but in restricted numbers as compared to the previous year. The geometrids which usually abound in this area were disappointingly low in number and variety.

After lunch the party moved along the Icknield Way to the A40 and spent the rest of the day in the National Nature Reserve on Bald Hill at the invitation of the

Nature Conservancy. This place is remarkable for the quantity of Juniper, *Juniperus communis* L., growing here. The wild, unspoiled nature of this area provided rather more moths for the lepidopterists who made up the party. This reserve is a place that should be visited again by the Society, perhaps at an earlier time of the year, and should prove rewarding to the micro enthusiasts.

The following lepidoptera were recorded: *Pieris brassicae* L., *P. rapae* L., *P. napi* L., *Melanargia galathea* L., *Pararge megera* L., *Maniola jurtina* L., *Aphantopus hyperantus* L., *Coenonympha pamphilus* L., *Vanessa atalanta* L., *V. cardui* L., *Aglais urticae* L., *Lysandra coridon* Poda, *Polyommatus icarus* Rott., *Ochlodes venata* Br. & Grey, *Thymelicus sylvestris* Poda, *Euproctis similis* Fuessl., *Callimorpha jacobaeae* L., *Plusia gamma* L., *Sterrhia trigeminata* Haw., *S. emarginata* L., *Colostygia pectinataria* Knoch, *Lyncometra ocellata* L., *Epirrhoe alternata* Müll., *Ortholitha chenopodiata* L., *Pyrausta purpuralis* L., *Opsibotys fuscalis* Schiff., *Udea lutealis* Hübn., *U. olivalis* Schiff., *Ostrinia nubilalis* Hübn., *Haritala ruralis* Scop., *Crambus perlellus* Scop., *Agriphila culmella* L., *A. inquinatella* Schiff., *A. tristella* Schiff., *Platyptilia pallidactyla* Haw., *Agapeta hamana* L., *Pandemis cinnamomeana* Treits., *P. heparana* Schiff., *Archips oporana* L., *Pseudargyrotoza conwagana* F., *Cnephasia chrysanthaneana* Dup., *Dichrorampha petiverella* L., *Laspeyresia aurana* F., *Lathronympha strigana* F., *Eucosma cana* Haw., *Epiblema scutulana* Schiff., *Olethreutes lacunana* Schiff., *Telphusa vulgella* Hübn., *Euspilapteryx aurogutella* Zell. and *Ypsolophus parenthesellus* L.

CADSDEN, BUCKS.—3rd August 1969

Leader: Mr. G. PRIOR

Eight members and friends met at Wendover station on a day promising to be wet and windy. The rain which was falling when the party moved off ceased by the time the collecting ground was reached and the day then became progressively sunny and warm. The area of woodland and scrub has a profuse and varied flora, and is also noted for its wealth of insects. During the morning Capt. J. Ellerton successfully demonstrated to other members how to search out and find *Eupithecia haworthiata* Doubl. in the flower heads of *Clematis vitalba* L. (Old Man's Beard). The large number of *Lysandra coridon* Poda on the wing was again a very welcome sight, as were the several *Gonepteryx rhamni* L. seen flying. Several species were noted that do not appear in Sir Eric Ansorge's *Macrolepidoptera of Buckinghamshire* as occurring in this spot.

This is an excellent locality for geometers, and nineteen species were recorded. Our President and Mr. E. S. Bradford were also fortunate in turning up several interesting micros, and the following coleoptera were recorded: *Coccinella septempunctata* L. and *Adalia decempunctata* L.

Lepidoptera noted included the following species: *Pieris brassicae* L., *P. napi* L., *P. rapae* L., *Gonepteryx rhamni* L., *Maniola jurtina* L., *Coenonympha pamphilus* L., *Aphantopus hyperantus* L., *Melanargia galathea* L., *Vanessa cardui* L., *V. io* L., *Aglais urticae* L., *Lycaena phlaeas* L., *Polyommatus icarus* Rott., *Lysandra coridon* Poda, *Thymelicus sylvestris* Poda, *Ochlodes venata* Br. & Grey, *Macrothylacia rubi* L., *Callimorpha jacobaeae* L., *Zygaena filipendulae* Schiff. s.sp. *anglicola* Tremewan ab. *cytisi* Hübn., *Eremobia ochroleuca* Schiff., *Hydraecia oculea* L., *Hypena proboscidalis* L., *Plusia gamma* L., *Phytometra viridaria* Clerck, *Sterrhia aversata* L., *S. dimidiata* Hufn., *S. biselata* Hufn., *Xanthorhoe spadicearia* Schiff., *Colostygia pectinataria* Knoch, *Euphyia bilineata* L. *Melanthis*

procellata Schiff., *Epirrhoë alternata* Müll., *Ortholitha chenopodiata* L., *O. bipunctaria* Schiff. s.sp. *cretata* Prout, *Anaitis eformata* Guen. *Eupithecia haworthiata* Doubl., *Abraxas grossulariata* L., *Deilinia pusaria* L., *D. exanthemata* Scop., *Ennomos quercinaria* Hufn., *Biston betularia* L., *Chiasmia clathrata* L., *Eurrhypara hortulata* L., *Nomophila noctuella* Schiff., *Pyrausta purpuralis* L., *P. aurata* Scop., *P. nigrita* Scop., *Udea ferrugalis* Hübn., *U. lutealis* Hübn., *Haritala ruralis* Scop., *Microstega hyalinalis* Hübn., *Agriphila culmella* L., *A. geniculea* Haw., *Stenoptilia bipunctidactyla* Scop., *Crombruggchia distans* Zell., *Pseudargyrotoza conwagana* F., *Grapholita compositella* F., *Olethreutes lacunana* Schiff., *Carcina quercana* F., *Argyresthia nitidella* F., *Ypsolophus sequellus* Clerck.

HORSELL COMMON, SURREY—10th August 1969

Leader: Mr. J. A. C. GREENWOOD

In the absence of Dr. C. G. M. de Worms who was scheduled to lead the party, Mr. J. A. C. Greenwood kindly consented to take the field meeting on this date, which fortunately turned out to be one of those very sunny and warm days which have been a feature of this wonderful summer. It attracted no less than 20 members and friends who reported a very good day's collecting with as many as 17 species of butterflies being recorded in the area of Horsell Common, which was very thoroughly surveyed, mainly in the region towards the Ottershaw road in the vicinity of the bog and Bleak House Inn. The heather was in full bloom which helped to attract the lepidoptera which, among the moths, were represented by that local heathland geometer *Selidosema brunnearia* Vill., of which five were noted; also by many *Plusia gamma* L., while other day fliers included *Anarta myrtilli* L., *Pachycnemia hippocastanaria* Hübn., *Lycophotia varia* Vill. and *Lygris testata* L.

Among the more interesting butterflies noted were *Vanessa cardui* L., *Polygonia c-album* L., *Nymphalis io* L., *Plebejus argus* L., *Polyommatus icarus* Rott., *Gonepteryx rhamni* L., *Maniola tithonus* L., *Eumenis semele* L., *Pararge megera* L., *Lycaena phlaeas* L. and *Celastrina argiolus* L.

KNOLE PARK, KENT—24th August 1969

Leader: Mr. R. W. J. UFFEN

This proved a disappointing meeting, although held on a fine day. There were no coleopterists present to explore the beetle fauna of the old trees. The lateness of the date and the slow rise of temperature after a cool night deprived us of finding any of the Diptera and Aculeate Hymenoptera that might breed in these trees.

On the acid grassland of the open parts only two species of grasshoppers were stridulating by midday. *Coenonympha pamphilus* L., *Lycaena phlaeas* L. *Polyommatus icarus* Rott., *Maniola jurtina* L., *Pararge aegeria* L., *Plusia gamma* L., *Agriphila tristella* Den. and Schiff. and *A. inquinatella* Den and Schiff. were about, but *Nomophila noctuella* Schiff., which has been taken abundantly at light traps in many places this season, was not seen at all.

THURSLEY, SURREY—30th August 1969

Leader: ALAN E. STUBBS

A group of the members attended the meeting. Most attention was paid to the bog and adjacent heathland and considerable interest was shown in the dragonfly management being carried out by the Surrey Naturalists' Trust on their reserve. The clearance of ditches and construction of new ponds was seen to have been very successful and dragonflies were abundant.

Mr. C. O. Hammond commented on the dragonflies as follows: 'By far the most plentiful dragonfly was *Sympetrum danae* Sulz. (*scotium* Leach) although *S. striolatum* Charp. was in fair numbers. It was pleasant to find several males of *Orthetrum coerulescens* F. still enjoying the late summer sunshine. One or two pairs of *Aeshna juncea* (L.) were seen in cop at the usual breeding spot by Pudmore pond. *Ceriagrion tenellum* de Vill. has established itself well and several males were still on the wing. *Lestes sponsa* (Hanse.) was, as usual, very common by ponds and over the heath.'

At an area of peaty mud with *Juncus articulatus* L. some of the most interesting finds were made. Several *Pogonota hircus* Zett. were observed among the *Juncus* stems, a cordylurid fly which was regarded as a northern species until found on southern bogs in recent years. The larval food plant, if any, is unknown, but *Carex rostrata* Stokes has been regarded as likely since it has often been taken on this plant as at Thursley. This occurrence of *P. hircus* was well isolated from *Carex rostrata*. Two uncommon craneflies were taken here; *Pilaris scutellata* Staeg. and *Erioptera nielseni* de Miejere, together with the commoner species *Limnophila meigeni* Verrall, *Erioptera fuscipennis* Meig. and *Molophilus occultus* de Meijere. Small ephydrid flies and small deltocephalid Homoptera were very abundant. An example of *Nymphula nymphaeata* L. was found which had probably bred in the *Potamogeton polygonifolius* Pourr. growing in the adjacent ditch.

On the edge of the bog several examples of the Tassel Gall were found on *Juncus acutiflorus* Hoffm. The gall consists of a tuft of reddish foliaceous out-growths from the inflorescence and despite its striking form, the stunted shoot results in the gall being inconspicuous among the low vegetation. The psyllid homopteron, *Livia juncorum* Lat., is the causative agent. A pale cream-coloured syrphid larva was found in the gall and was still alive in a tube containing the gall the following January.

Several interesting flies were found on the heathland, including *Nephrotoma scurra* Meig. and *Tachina larvarum* L., and at the edge of the bog, *Prionocera turcica* F., *Neoascia dispar* Meig. and *Chrysogaster macquarti* Loew were found.

The experimental plots for heather management were visited, but the weather was not suitable to encourage many species to be active.

A piece of alder carr along the edge of a stream provided a last good find: a specimen of the cranefly *Dicranota subtilis* Loew which according to the *Handbook for the Identification of British Insects* is not found further south than Shropshire. Perhaps it was a good year for this species since in July a male was taken at Welford, Berks., and in September single examples were taken at Godstone, Surrey, and Over Wallop, N. Hants, in all cases by streams as is the habit with the genus.

STANFORD-LE-HOPE, ESSEX—7th September 1969

Leader: Mr. R. TOMLINSON

Four people attended this meeting all assembling at the railway station. Eric Bradford from Boreham Wood, Ron Payne from Westcliff, Gunther Wewelka, a young Austrian coleopterist from Vienna, and the leader.

As last year, an inspection of the ceiling and walls of the station waiting room was made; this revealed a total of nine species of Lepidoptera, attracted there during the previous night by the station lights. These were *Cleora rhomboidaria* Schiff., *Leucania impura* Hübn., *Luperina testacea* Schiff., *Amathes c-nigrum* L., *Phlogophora meticulosa* L., *Mamestra brassicae* L., *Amphipyra pyramidaea* L., *Mesographa forficalis* L. and *Notocelia uddmanniana* L.

We motored round to Mucking Church where we went on to the fairly extensive reed-beds of Mucking marsh. Bradford searched for mined leaves along a black-thorn hedge, whilst the two coleopterists sifted just as diligently through *Phragmites* litter on the edge of the reed-bed.

Three carabid beetles taken in this manner were: *Dromius melanocephalus* Dej., *Pterostichus vernalis* Panz. and *Agonum thoreyi* Dej.

After about an hour there we drove on to the nearby 'Golden Gates' area. Here the following Orthoptera were found: *Tetrix undulata* Sowerby, *T. vittata* Zett., *Conocephalus dorsalis* Lat. and *Pholidoptera griseoaptera* Deg.

Lepidoptera seen here were: *Pieris brassicae* L., *P. rapae* L., *Pararge aegeria* L., *Coenonympha pamphilus* L., *Gortyna micacea* Esp., *Rivula sericealis* Esp., *Monopis rusticella* Hübn., *Agriphila inquinatella* Schiff., *A. tristella* Schiff., *Bactra lanceolana* Hübn., *Agonopteryx alstroemeriana* Clerck, *Cataclysta lemnata* L., *Anthophila fabriciana* L., *Hypena proboscidalis* L., *Calothysanis amata* L. and we found larvae of *Callimorpha jacobaeae* L. on Ragwort.

Seed-heads of *Juncus* sedge containing larval cases of Coleophoridae were collected and Bradford also obtained a number of oak leaves that contained a lepidopterous inmate on just one lobe of each leaf.

More beetles taken here included *Amara convexiuscula* Marsh. swept from *Atriplex*, *Carabus granulatus* L. from a stump of wood, and *Pterostichus nigrita* F., *Dromius quadrinotatus* Panz. and *D. linearis* Ol. under the bark of dead *Salix*, and *Calathus fuscipes* Goeze and *Bradycellus verbasci* Duft. under stones on gravelly soil. Also recorded was the fly *Platycheirus fulviventris* Macquart and the sawfly *Nematus salicis* L.

It was an enjoyable meeting and was not marred by the dreadful rainstorms that hit last year's meeting here.

BOOKHAM COMMON, SURREY—21st September, 1969

Leader: Mr. R. W. J. UFFEN

Nine members and children enjoyed a fine day on Bookham Great Common. Some members beat the bushes on the plain for caterpillars, but did not find large numbers despite the abundance of moths in high summer. Other members looked for micro moth larvae in the stems and leaves of various plants. Two members sampled the Diptera and found them plentiful, but had no very notable species to report at the time of capture.

The leader discussed with the National Trust's warden the area of Bayfield Plain that has been cleared of scrub. It is being swiped in July every two or three

years to check the re-encroachment of hawthorn. The month of treatment may explain why *Angelica* is the dominant umbellifer on this part, where in the leader's recollection the earlier-flowering *Heracleum* used to flourish best before the invasion by scrub. The flowering herbs are growing well on this plot.

Swiping as late as July could destroy the crop of seeds attacked by many micro-lepidoptera and other insects. Their ability to colonize this area should be studied over the years of a cycle of maintenance.

Three tiny cases of *Coleophora siccifolia* Staint. were found peppering the leaves of a hawthorn on a woodland ride with tiny mines or already spun to its twigs for the winter. Other micro larvae were of: *Acrocercops brogniardella* F., empty communal mines on oak; *Bedellia somnulentella* Zell. on *Calystegia* sp.; *Lithocolletis tristrigella* Haw., mine with cocoon, *Stigmella marginicolella* Staint. and *S. ulmicola* Hering, all on elm near the station; *Diurnea fagella* F. on oak and *Iso phriictis tanacetella* Schrank in *Achillea ptarmica* L. heads beside the main path from the station.

Lepidoptera in flight or disturbed were: *Vanessa atalanta* L., *Aglais urticae* L., *Polygonia c-album* L., *Coenonympha pamphilus* L., *Pararge aegeria* L., *Pieris brassicae* L., *Plusia gamma* L., *Hypena proboscidalis* L. and *Anthophila fabriciana* L.

Apatele tridens Schiff. larvae on sallow were from second instar to fully fed. A colony of *Phalera bucephala* L. larvae on oak was two-thirds grown. An *Apatele ruminicis* L. larva was fully fed. No list of the other caterpillars seen is available.

The large gall of *Cynips quercusfolii* L. was noted beneath the mid rib of an oak leaf.

WORPLESDON, SURREY—27th September 1969

Leader: Mr. R. F. BRETHERTON

Eleven members and friends met at Worplesdon station at 7 p.m. Though the train disgorged no additions, three of the party had come by car from as far afield as Croydon. Unfortunately, as on the previous experimental evening meeting in April, weather conditions were unpropitious; a clear sky, a large moon, and a rapid drop of temperature to near freezing point.

The party worked the heath and mixed woodland around the Jolly Farmer Inn on Whitmoor Common, with the help of two mercury vapour and two actinic lights and a round of sugared trees. The lights attracted about two dozen examples comprising nine species of Lepidoptera: *Aporophyla lunula* Stroem, *Agrochola circellaris* Hufn., *A. lychnidis* Schiff., *Anchoscelis litura* L., *Citria lutea* Stroem, *Cirrhia icteritia* Hufn. *Conistra vaccinii* L., *Phlogophora meticulosa* L., *Nomophila noctuella* Schiff. Rather surprisingly, the sugar yielded a dozen insects, including four *Anchoscelis helvola* L., which was not seen at light. None of the rarer species which might be expected here on a good night turned up in such hopeless conditions and the members of the party, showing varying degrees of resistance to cold, had completely dispersed by about 10 p.m.

PROCEEDINGS

22nd JANUARY 1970.

98th ANNUAL GENERAL MEETING (with which was combined the ordinary meeting)

The President, Capt. J. ELLERTON, R.N., in the Chair

The President welcomed to the Meeting Dr. Boucek from Prague and Mr. and Mrs. D'Abrera from Melbourne.

The following new members were declared elected: Miss V. I. Dick, Mr. F. N. Mawer and Mr. J. T. Scanes.

EXHIBITS

Mr. A. E. STUBBS—Two species of Diptera. (1) *Copromyza pedestris* Meig. (Sphaeroceridae) a wingless species taken in *Phragmites* litter at Leckford, N. Hants, 13.xii.69. (2) *Lipsothrix ecucullata* Edwards (Tipulidae), one of two males taken in July 1969 at Corrishalloch National Nature Reserve, Ross and Cromarty. The species was previously known in Britain only from the holotype male taken in Sutherland and a male in the British Museum (Nat. Hist.) taken by G. Hosie near Rannoch, Perth.

COMMUNICATIONS

Mr. G. M. DE ROUGEMONT said he had recently purchased some fruits of the plant *Abelmoschus esculentus* L. and had found a larva of the moth *Earias huegeli* Rogenhofer (Noctuidae). After cooking these he found they were not fit to eat because of the number of larvae in them.

Several small pink lepidopterous larvae were reported to have been found in almonds by Mr. F. D. BUCK. He asked if anyone knew the species. Mr. S. N. A. JACOBS said that if they had a spot and bristle on the second thoracic segment they were likely to be *Ephestia elutella* Hübn. (Pyralidae) or if they had a spot and bristle on the anal segment it would probably be *Plodia interpunctella* Hübn. (Pyralidae). Mr. E. S. BRADFORD said he had bred *Myelois ceratoniae* Zell. (Pyralidae) from almonds.

The PRESIDENT announced that Mr. E. W. Classey had donated to the Society a copy of the *Entomologists' Compendium* by Moses Harris and a number of back numbers of the *Entomologist* and *Entomologist's Record* to be sold at 10/- per volume for the benefit of the Centenary Fund.

The Treasurer, Mr. R. F. BRETHERTON, read a report on the Society's finances and moved its adoption. The report was seconded by Mr. E. W. CLASSEY and carried.

The Council's Report was presented by Mr. D. A. ODD who moved the adoption. Mr. J. M. CHALMERS-HUNT seconded the report which was carried.

Mr. A. S. WHEELER presented the Librarian's Report, Mr. A. E. GARDNER the Curator's Report and Mr. F. D. BUCK the Editor's Report.

The PRESIDENT declared the following officers and ordinary members of council elected for the ensuing year: President, Dr. B. J. MACNULTY, B.Sc., PH.D., F.R.I.C., F.L.S., F.R.E.S.; Vice-Presidents, Capt. J. ELLERTON, D.S.C., R.N., and

Col. A. M. EMMET, M.B.E., T.D., M.A.; *Treasurer*, R. F. BRETHERTON, C.B.E., M.A., F.R.E.S.; *Secretary*, D. A. ODD, F.R.E.S., F.Z.S.; *Editor*, F. D. BUCK, A.M.I.PTG.M., F.R.E.S.; *Curator*, A. E. GARDNER, F.R.E.S.; *Librarian*, S. A. WILLIAMS, F.R.E.S.; *Lanternist*, M. SHAFFER; *Ordinary Members of Council*, R. G. CHATELAIN, E. W. CLASSEY, F.R.E.S., D. J. CARTER, A. S. F. RIPON, C. O. HAMMOND, F.R.E.S., C. MACKECHNIE JARVIS, F.L.S., M. G. MORRIS M.A., PH.D., F.R.E.S., D. O'KEEFFE, M.I.O.M., K. A. SPENCER, B.A., F.R.E.S., B. GOATER, B.Sc.

Under bye-law 25(b) Mr. R. S. TURBS raised the question of the decision not to publish the complete Annual Exhibition report. The President explained that the Council had carefully considered this matter and had reluctantly decided against publication because of the very high cost.

Capt. ELLERTON read his Presidential Address on microlepidoptera added to the British List (see p. 31).

A vote of thanks to Capt. Ellerton for his services during the past year combined with a request for permission to publish his Address was moved by the incoming President, Dr. B. J. MACNULTY. In his reply Capt. ELLERTON agreed to the request.

Mr. A. S. F. RIPON moved a vote of thanks to the Officers and Council which was seconded by Mr. S. N. A. JACOBS and carried by acclamation. Mr. D. A. ODD replied.

From the Chair the PRESIDENT moved a vote of thanks to the auditors which was carried unanimously.

12th FEBRUARY 1970

The President, Dr. B. J. MACNULTY, in the Chair

The death was announced of Mr. H. E. Webb.

The following new members were declared elected: Messrs. D. J. Driscoll, M. W. Decourcy Tresenter, E. N. Maserus, P. J. Renshaw and D. B. Tyler.

EXHIBITS

The PRESIDENT—*Clivina fossor* (L.) (Col., Carabidae) from Edale, Derby., 21.vi.69. The insects were found under stones which had fallen from a dry-stone wall. Both Fowler (1887, *Col. Brit. Is.*, 1:20) and Joy (1932, *Pract. Handbk. Brit. Beetles*, 1:331) describe it as common and widespread. However this was the first time the exhibitor has found the species, though he had frequently searched under stones and dung (Fowler, *loc. cit.*, records dung) in many parts of the country without turning it up.

Mr. F. D. BUCK—A single example of *Stenopteryx hirundinis* L. (Dipt., Hippoboscidae) from Tiptree, N. Essex, 8.viii.69. The insect was found in the house. The species is not uncommon, but since it is flightless and of retiring habits, is seldom seen. It is parasitic on House Martins, *Delichon urbica* (L.), and according to Mr. A. M. Hutson of the British Museum (Nat. Hist.), is widely distributed throughout the palaeartic region, being found as far east as Japan and spreading as far south as North Africa and the Himalayas. Its northern range is not so clearly defined, but in Britain it occurs throughout the breeding range of the House Martin. There is an excellent line illustration of the species by Mr. C. O. Hammond in Coe (1949, *Handbk. Iden. Brit. Insects* 9(1);34, fig. 92).

Mr. A. E. STUBBS—(1) *Molophilus ater* (Meig.) (Dipt., Tipulidae), a smal-

black cranefly with abbreviated wings, a female taken 2.vi.55 at Rhin Fawr Montgomery, with, for comparison, a fully winged black species *M. bihamatus*, de Meij., male from Godalming, Surrey 2.vi.67. The latter is a rare species not previously recorded from Surrey. (2) *Sicodus submorio* Collin (Dipt., Empidae). A female taken at Godalming, Surrey, 8.vi.68, by sweeping densely shaded marsh vegetation. The species was described as new by J. E. Collin in 1961 (*British Flies*, vol. 6) and was then known only from Hereford, Suffolk and Italy.

COMMUNICATIONS

Mr. A. E. GARDNER reported that Mr. F. T. Vallins had donated a number of double sided glass drawers which would be useful for exhibition purposes.

Referring to the exhibit by Mr. Stubbs on the 22nd January (see page 57) Mr. F. D. BUCK said that a variety of dipterous species could be found in grass tufts, some of which were rarely found elsewhere.

The Wallcreeper, *Tichodroma muraria* (L.), a European bird, was reported to be in a quarry at Swanage. He said it had been there since September last and was the seventh British record, the last being in Lancs.

Mr. R. Foord gave the second part of his talk on 'The British Orthoptera' which he illustrated with coloured transparencies, and which was followed by a discussion.

26th FEBRUARY 1970

A Vice-President, Col. A. M. EMMET, in the Chair

The following new members were declared elected; Messrs. C. M. Barksdale and S. G. Kirby.

EXHIBITS

Mr. C. O. HAMMOND—A female *Ephialtes imperator* Kreichbaumer (Hym., Ichneumonidae) taken on a tree stump at Grantown-on-Spey, Moray, 13.vii.69. This is the largest insect in the genus of some 40 species and can equal in size the well-known *Rhyssa persuasoria* (L.).

COMMUNICATIONS

Mr. S. N. A. JACOBS reported that a working party of five members attended at Trottiscliffe and did some excellent work clearing scrub.

A report was given on the situation regarding the fencing and ploughing of Ditchling Common.

An early date, 21st February, was cited by Mr. J. L. MESSENGER for *Dasyycampa rubiginea* Schiff. (Lep., Noctuidae); Mr. S. N. A. JACOBS said he had observed *Scoliopteryx libatrix* L. (Lep., Plusiidae) on 25th February; Mr. G. PRIOR reported a *Nymphalis io* L. (Lep., Nymphalidae); and Mr. E. S. BRADFORD, *Cacoecimorpha pronubana* Hübn. (Lep., Tortricidae).

Col. A. M. EMMET said that *Coleophora wockeella* Zell (Lep., Coleophoridae) larvae had commenced feeding again, and he added that Mr. J. M. Chalmers-Hunt's larvae had also started to feed again.

A discussion took place on 'Field Meetings, Past, Present and Future', which was opened by Col. Emmet, who gave the following five purposes for holding field meetings: (1) to augment collections; (2) to see if species still occurred, to look for new species and to record known species in the area; (3) instruction; (4) social contacts; and (5) habitat improvement and conservation. He also suggested that the types of meetings would fall into the following four types:

(1) ordinary meetings (Saturday or Sunday); (2) weekend meetings; (3) joint meetings with other societies; and (4) night collecting.

Because of members varied interests, Mr. A. E. STUBBS thought we should maintain as wide a variety as possible in our field activities. Mr. E. W. CLASSEY believed that the entomology of reserves could be regarded as a sixth purpose of these meetings, and Mr. F. D. BUCK thought attention should be paid to providing information useful to the defence of those areas at risk, to which Mr. Stubbs added that we should need much more ecological information.

Commenting on recording, Col. Emmet thought there was two kinds of recording: (1) full recording as attempted by the Monks Wood organisation; and (2) the recording of rare and valuable species.

It appeared from the discussion that the key to our field activities lay in the leaders available.

12th MARCH 1970

The President, Dr. B. J. MACNULTY, in the Chair

The death was announced of Mr. C. N. Hawkins.

The following new member was declared elected: Mr. P. R. Meredith.

EXHIBITS

The PRESIDENT—The following chrysomelid Coleoptera: *Chrysolina cerealis* L. from Snowdon, 2.viii.69; *C. fastuosa* Scop. from Long Mountain, Montgomery, 6.viii.69, very commonly on *Stachys arvensis* (L.) L.; *Gastroidea viridula* Deg., from Canaston Bridge, Pembs., 12.vii.69, on *Rumex*.

Mr. A. E. GARDNER—The following Coleoptera taken near Lyndhurst, Hants., 7–8.iii.70: *Heptaulacus testudinarius* (F.) (Scarabaeidae), under dung on sandy soil; *Cicones variegatus* (Hell.) (Colydiidae), *Rhyncolus truncorum* Germ. and *R. lignarius* (Marsh.) (Curculionidae) under beech bark. Also *Phloiotryia rufipes* (Gyll.) (Serropalpidae), a female dug out of dead oak near Lyndhurst, 20.vii.69.

Mr. T. G. HOWARTH—A post card containing postage stamps from Yugoslavia illustrating Coleoptera and Lepidoptera.

COMMUNICATIONS

A new gull to Europe was reported by Mr. A. E. GARDNER. It was Fryer's Gull an American species which had been seen in the Portsmouth area for the past two weeks.

An example of *Limenitis camilla* L. (Lep., Nymphalidae) was reported to have been seen in Ruislip on 29.vii.69 by Mr. M. E. M. Majerus.

A talk was given by Mr. A. G. M. Batten 'A Philatelic approach to Entomology' which he illustrated with coloured transparencies.

OUR MEMBERSHIP

Members will have recently received a new list of members, revised to 21st February 1970. It is hoped to keep this up-to-date for some years by the circulation of annual corrigenda slips, as the turnover of members, and especially of addresses, is large.

The new list contains 575 names, compared with 562 in the previous list, which was revised to 1st July 1967—a time of year when our membership is usually rather larger than in February. It also contains a geographical list of members' addresses, which was last provided, for a total of 496 members, in 1960 (*Proceedings*, 1959, xxvi–xxxiv). The Society now has members resident in every county in England except Norfolk, Northumberland and Nottinghamshire, in eight counties in Wales, and eight in Scotland, with two members each in Ireland and the Channel Islands. Outside the British Isles we have 35 members, spread over 21 countries. The centre of gravity is, however, still very much in the south-east, with London (76) and Surrey (73) running neck and neck and Kent (60) not far behind; with Bucks, Essex, Herts and Middlesex included, over half our membership is in the Home Counties.

It is interesting to compare this distribution with that of the (smaller) membership of 1960. The spread was somewhat less wide. We had then no members in Hunts., Rutland, Shropshire, Staffs., or the Channel Islands (though there was one in Notts.); and only two Welsh and five Scottish counties were represented; our membership abroad (29) was proportionately about the same. The Home Counties bulked rather larger—55 per cent against 52 per cent; and within this there were both absolutely and relatively more members with addresses in London itself (83 against 76). We have lost membership rather markedly since 1960 in the old entomological centres of Warwickshire (a fall from 15 to 8), Lancashire (9 to 5) and Yorkshire (9 to 7); but there have been notable increases in Berkshire (13 to 22), Derbyshire (1 to 7), Northants (6 to 11) and Dorset (5 to 9).

Of the present members over 170 were elected from 1965 onwards, a further 106 in 1960 to 1964, so that nearly half have had less than ten years membership. A further 232 date from the previous two decades, and 64 go back before the second world war. Our senior member, Capt. N. D. Riley, was elected in 1908.

The balance of members' interests can also be surveyed from the list. Of course, many members state several interests, some of the categories overlap, and some members change their interests after they have joined the Society without asking for correction of their original entry, so that close analysis is not possible. About 730 entries appear in the new 1970 list. About 100 of these are general, with entomology much in the lead, followed by natural history, nature photography, ecology, genetics, marine life and systematics. Of about two dozen different specified interests, Lepidoptera account for 400, Coleoptera for 67 and other insect orders together for a similar number; ornithology for ten, botany for 13 and reptiles and crustacea for 6. Relatively the balance seems to have changed hardly at all since 1960. Certainly, despite the dominance of the lepidopterists in mere numbers, there is no lack of variety in the tastes of members.

R. F. BRETHERTON

OBITUARY

HARRY E. WEBB 1885-1970

Harry was born in London where he lived and worked all his life until only two years ago when he gave up his house in Hendon and went to live alternately with his two sons in Hampshire and in Buckinghamshire.

As a young man he worked in the City of London and developed a great affection for the City which remained with him all his life. He was a religious man, and had a keen appreciation of good music.

Just after the First World War he joined the Idris Table Water Company and remained with them until he retired in 1950. For the next five years, until he was 70, he returned to the City, working for a printing company, retiring finally in 1955.

It was as a boy Harry developed his interest in Lepidoptera, an interest probably acquired from his uncle who was a keen lepidopterist residing in Bedfordshire. His interest lapsed however, until his younger son showed a liking for these insects in the early 1940's, and his enthusiasm fully returned when this son took *Limenitis camilla* L. on Stanmore Common in 1942. Harry treated his hobby very much as a relaxation, which probably accounts for why he did not appear much in print. He was happiest with his breeding cages, and had no small success in filling his cabinet in this way with choice specimens. His last attempt at breeding, quite recently, was with the *valesina* Esp. strain of *Argynnis paphia* L.; unfortunately it was not attended by success.

It was in 1945 that he joined our Society and immediately became an active member keenly interested in the well-being of the 'South London'. Harry was first elected to the Council in 1948, and again served in 1950-1 and 1953-4. His enthusiasm for field work led him to accept appointment as Assistant Secretary for Field Meetings in 1951 and 1952; a job he did with outstanding success, organising coach trips to less accessible localities such as the New Forest, Saulcey Forest, Folkestone Warren, etc.—and filling the coaches.

Finally he served as our lanternist in 1955. This was the year of his retirement, and finding his income restricted combined with failing eyesight, he attended fewer and fewer meetings, greatly to our regret.

Harry was a quiet sort, with an old-world charm and a capacity for making friends that is rarely seen. He had a delightful sense of humour that made his company such a pleasure—he was in fact a happy man who always seemed to be making the very best of life.

His interest in Lepidoptera lives on in his youngest son and two grandsons who have his excellent collection to guide them.

F. D. B.

The Society's Publications

Back numbers of the Society's Publications still in print are becoming scarce. We regret therefore that we have had to reassess their value and new prices have been agreed. These are as follows:—

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* These copies are very scarce and contain papers in great demand. Member's discount cannot therefore be allowed.

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MEETINGS OF THE SOCIETY

are held regularly at the Society's Rooms, but the well-known ANNUAL EXHIBITION takes place this year on November 1st in the Conversazione Room at the British Museum (Natural History). Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings. The current Programme Card can be had on application to the Secretary.

B 8521

ENT

AUGUST 1970

Vol. 3 Part 3

Proceedings and Transactions of The British Entomological and Natural History Society

The correct abbreviation for this publication is:—
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Price: Thirteen Shillings

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**PIERIS NAPI L.: SPECIATION AND SUBSPECIATION
(LEP., PIERIDAE)**

By S. R. BOWDEN

There are very good reasons for pursuing the study of animal speciation in butterflies. The distribution of their forms is known probably better than for any other animals, because not only are they conspicuous but thousands of collected or bred specimens can be made accessible with little trouble. The *Pieris napi-bryoniae-melete* superspecies offers special advantages: it is now distributed over an immense area, yet individual populations are sedentary enough to allow the persistence of local subspecies. The wing patterns are made up of separate elements, often under rather simple genetic control, and combinations of these (some very extreme) characterise visible phenotypes, which then facilitate the recognition of the more important cryptic characters. Residence in the northern temperate zone has exposed the group to enforced range-changes during the fluctuating climates of the last million years and the artificial ecological disasters of the last ten thousand; study is concentrated on the effects of these changes in promoting speciation.

Six years ago Ford (1964) put the commonsense view of what had appeared the central problem (the 'semispecies' status of *P. bryoniae* Ochsenheimer), although his treatment had to be in part superficial. Warren (1963, 1965, 1967, 1969) based a series of studies on the androconial scales, which obliged him to separate, as species or 'hybrid species', taxons which had previously been assigned only subspecific rank. Meanwhile the experimental breeding work of Lorković and of the present author proceeded all too slowly.

My own contribution has been made almost entirely by pairing non-sympatric subspecies in captivity and noting the magnitude of the effects of the resulting genetic imbalance. Sterility or inviability of the F_1 , F_2 or F_3 hybrids, protogyny or excessive protandry, sexual mosaicism and irregularities of mitosis are among the phenomena met with. If disturbances are only slight, one imagines that the subspecies concerned are capable of re-integration; if they are great, barriers to inter-population pairing can be expected to rise progressively and we have at least incipient species.

It is nevertheless frequently impossible to decide finally whether allopatric populations represent separate species or geographic subspecies of a single polytypic species. Nor is it particularly important that the line should be 'correctly' drawn, when the subspecies are not in contact. Even within a subspecies, partly isolated local demes differ genetically; if every grade of difference justified a name, some populations would have as many as a royal prince. In the *Pieris napi* group we have an aggregate of subspecies and clines, with every degree of reproductive isolation between its units—barring the experimentally fatal one of complete F_1 inviability. Names such as *Pieris (napi) bryoniae adalwinda* are trying to accomplish more than names should be asked to do. Those interested will discover from sources other than the label, that *Pieris napi* does include separated populations whose reproductive isolation would be almost complete, and would tend to increase still further, if they could be brought together in natural conditions. For the present I still follow Mayr *et al.* (1953) in treating non-sympatric taxons as subspecies within species, when there is any choice. But in many cases they can equally well be taken as semispecies within superspecies. In either case the conventional trinomial will indicate both close relationship and allopatry: the precise nature of the relationship may remain to be discovered. In the end every case will have to be reconsidered on its merits.

*

It is evident that this short survey, which can deal with only a few questions in general terms, will not be the final treatment of its subject. If central Asia were as tightly packed with entomologists as Kent or Connecticut we might soon know a great deal more. But even if Asia becomes more accessible, no one can visit it in the Pliocene, or even in the last interglacial. The surviving fauna probably offers no more than hints of the evolution of present *Pieris*; these hints we must do our best to take. We have not yet adequately investigated present relationships in south-east Europe or western North America—leaving aside the Atlas of north-west Africa. There is much to be done, before human encroachment on the remaining wilderness puts whole subspecies in peril. Meanwhile, conclusions are provisional.

The name *Pieris napi* is comprehensive enough, but it cannot be extended to cover (say) *P. ergane* Geyer, although this has been shown by various authors, from Lorković (1928) to Warren (1961), to belong with *napi* rather than with *rapae* L. Good reasons exist for separating also at least *virginiensis* Edwards, *melete* Ménétriers and perhaps *bryoniae* as species. *Melete* indeed seems to have its own '*bryoniae*' forms, as in the Sikkim mountains. But most local subspecies of all these share some diagnostic characters with a near-sympatric subspecies of undoubted *napi*. For example, the visible characters in which Swiss *bryoniae* resembles the adjacent *P. napi napi* outnumber those in which the latter resembles eastern North American *P. napi oleracea* Harris. One possible explanation would postulate widespread introgressive hybridisation in the remote past, but in this form the suggestion is too vague to be useful.

Some authors (Petersen 1955, Lorković 1962, Ford 1964) have at times written almost as if visible characters constituted the essence of the species, though obviously they do not believe this. In the case of the 'species' *bryoniae*, the distinguishing features usually taken are: in the females ochreous ground-colour and heavy radial marking, in the males an all-white underside ground occurring apparently as a balanced polymorph (*f. subtalba* Schima). Müller and Kautz (1939) however already illustrated *napi*-like *bryoniae* females. It has indeed been suggested that *napi*-*bryoniae* is everywhere potentially dimorphic in the female, and that local selection-pressure have determined the pigmentation of each population. This view leaves an author free to allot to *bryoniae* insects showing no elements of the characteristic Alpine phenotype (all Nearctic *napi*, Edwards 1881 and Müller and Kautz 1939; Corsican *napi*, Warren 1963).

The low-level *bryoniae* localities in the Austrian Alps (e.g. Mödling) are inhabited by a breeding population (ssp. *flavescens* Wagner) comprising a wide variety of *napi*-*bryoniae* 'modifications' (Müller and Kautz 1939). These reproduce the phenotypes obtained in the F₂ and back-crosses when high-altitude *bryoniae* is hybridised with *napi*, and Petersen (1955) concluded that they indeed represented a hybrid swarm. They could alternatively be regarded, however, as an incompletely differentiated *bryoniae*; in behavioural characters they are said to resemble ssp. *bryoniae*.

It is as well to be clear what one means when speaking of hybrid populations, especially in respect of time-scale. Very commonly hybridisation between two subspecies, previously geographically separate, has produced a wide zone of mixed forms and a cline is established, which imitates the pattern developed by local adaptation of a single subspecies to a wide range of environmental conditions. Similar adaptation must usually occur in the hybrid cline also and control its extent; in principle hybridisation will still be continuing but its extension may be imperceptible. If, however, the hybridisation is between incipient species, we may expect mechanisms of sexual selection to build up and halt it. How long such

a process will take we have little idea; it may be of the order of 10,000 years.

At Mödling a hybrid population could be considered to have been established in the early post-glacial and to have persisted ever since, without (or more probably with) constant minor introgression by *napi*. As the '*bryoniae*' visible characters are genetically dominant they will not soon be swamped by moderate crossing with *napi*; the balance is likely to be determined by selective influences on various gene-combinations (of which we know almost nothing).

At other places, in the southern Alps, such as Petersen's (1955) experimental site at Monte Mottarone, the hybridisation is supposed to be that of the present day, with rigorous altitudinal selection largely eliminating the apparent hybrids every season.

In Carinthia, on the other hand, ssp. *neobryoniae* Sheljuzhko presents a different picture. The butterflies are generally larger than typical ssp. *bryoniae* and *napi*, which is not the case at Mödling. We should expect F₁ hybrids to be heterotic, but the resulting increase in size would be lost in subsequent generations. All re-combinations of the '*napi*' and '*bryoniae*' characters are present, with *f. subtalba* probably more general than in any single-brooded *bryoniae*. Some of the differences from ssp. *flavescens* might be accounted for by supposing that *neobryoniae* derives from hybridisation of *bryoniae* with the Mediterranean ssp. *meridionalis* Heyne instead of with the central European ssp. *napi*. But if so the inter-breeding must have occurred long ago, and it would be safer to regard the parental *napi* as quite uncertain. In the case of *neobryoniae* the hybridisation hypothesis may well be mistaken.

Since *f. subtalba* is not encountered in the north Scandinavian '*bryoniae*' (*P. napi adalwinda* Fruhstorfer) and is found in only part of the Swiss Alps, one can surmise that it was not present in the pre-glacial or late-glacial *napi-bryoniae* of Europe. It seems to exist farther east in the *ochsenheimeri* Staudinger of Turkestan, a small insect otherwise having some remarkable resemblances to *neobryoniae*. Thus the *neobryoniae* stock may have possessed much of its present character before reaching Europe, and may indeed always have had females dimorphic in respect of marking and of ground-colour. It would naturally be incorrect to say that *neobryoniae* is derived from *ochsenheimeri*.

Although hybrid populations may certainly be found between contemporary subspecies which have come into secondary contact, I have not found the concept (Warren 1966, 1967, 1969) of the 'hybrid species' useful. The term seems to imply reproductively successful pairing between distinct species, which in the wild is impossible by the usual definition: if interspecific hybridisation takes place, it fails reproductively on account of the reduced Darwinian fitness of the hybrids. If 'hybrid species' is applied merely to the product of an episode of reticulate evolution at the subspecies level, followed by a period of relative isolation from further introgression, the conception becomes difficult to define and even more difficult to apply convincingly to a particular case. Gene-interchange between original subspecies will soon produce a newly integrated gene-pool which will in itself be unrecognisable as hybrid. I do not think, for example, that any unitary population maintaining itself in nature will constantly show teratological androconial scales solely on account of hybridisation thousands of generations before. Warren's argument seems to be: 'Hybrids produce many deformed scales; this is incontrovertible proof that butterflies with many deformed scales are hybrids.' It does not follow, and there must be another factor, since some very wide F₁ hybrids (e.g. European *bryoniae* × New Hampshire *oleracea*) produce perfectly developed symmetrical scales (Warren 1967).

Deformed scales do occur when for any reason the insect is almost, but not

quite, capable of forming a perfect imago. Many artificially obtained hybrids are in this condition, but so sometimes are individuals of pure subspecies subject to mildly unfavourable environmental conditions—which when more extreme cause general thin scaling or even crippling. However, one need not suggest that many of the specimens on which Warren has worked were crypto-cripples. If one refers to Dixey's (1932) study of pierine androconia, one finds spinous projections on the cornua of the scales illustrated for *Pieris ajaka* Moore, *davidina* Oberthur and *oleracea* Harris. In the related genus *Pereute*, all the species have sharply pointed cornua, often unsymmetrical. They cannot all be hybrids? Warren's argument would seem to need modification. But if I find it hard to follow Warren in all his conclusions, the difficulties do not destroy the value of his work, to which I cannot do justice here. Androconial shape is in *Pieris* a character of the highest taxonomic value; the startling differences between the subgenera are evidence of this.

As a convention for indicating probable descent the 'hybrid species' can be applied only with caution. Even the post-glacial history of butterflies is a matter of inference only. Except where a subspecific name has been given to a point on a cline, no present subspecies has evolved from another present subspecies. The time-scale is a long one, measured for full species usually in hundreds of thousands of years, but populations are very fluid except when steadily contracting.

We should minimise the dependence of nomenclature on theories of descent. Petersen (1958) took the opposite view, and elevated supposed common ancestry even above reproductive community. He allotted the north Scottish forms of *napi* to a cline *napi* × *bryoniae*, though no pure '*bryoniae*' now existed on their northern side; all the Irish *napi* he supposed to have evolved from a glacial *bryoniae* in nearly complete isolation, so that their name had to be *Pieris bryoniae britannica* Verity. It will be inconvenient if we have to move a subspecies from one species to another according to our current opinion of its migratory ability or of past changes in sea-level. Name-changes are always regrettable.

Reading earlier studies bearing on the palaeogeography of the Pieridae (e.g. Verity 1928, 1947, Müller & Kautz 1939, Ford 1945, Beirne 1943 and 1952, Warnecke 1958, Wiltshire 1962), one is finally convinced of the essential correctness of their main conclusions, flimsy though the arguments necessarily seem at first to be. I can contribute little original on this subject: I am willing to accept as well-founded the supposition that *Pieris* originated as early as the Miocene (Zeuner 1942) in the ancient Angara-land or central Asia, speciated there through the Pliocene and later, spreading west and east to occupy, at some time or another, the greater part of the Holarctic. The Asiatic territory has varied in climate and vegetation, but it largely escaped the rigours of the Pleistocene, as indeed did much of Alaska. The Beringian land-bridge (also unglaciated) was frequently wide. The distribution of *napi* subspecies in America results from the past geography of Beringia-Alaska and the effects of the great glaciations (Rand 1948, Howden 1969). Human influence on this group has apparently been slighter.

It will probably not be too difficult eventually to construct a scheme for the origins of the North American *napi*, using evidence that is still accessible. The specialised *P. virginensis*, with its almost European-type underside veining (and with the *subtalba* morph apparently fixed), is probably much the oldest stock and may have been more widely distributed in pre-glacial times, if not recently. *Pieris napi oleracea*, showing resemblances to present-day Asiatic forms, but also important differences, probably spread into America in one of the interglacials or earlier and has ebbed and flowed with the glacial phases. In the west *venosa* Scudder, with its much stronger upperside markings, *macdunnoughii* Remington

and the very odd *marginalis* Scudder may perhaps be grouped with *oleracea*, though clearly their histories have differed greatly. The third group comprises the *bryoniae*-like populations of the north.

It is likely that these last have a distinct origin: they much resemble the Scandinavian *adalwinda* and it is not unreasonable to suppose that the present circumpolar arctic populations were formerly one; they escaped glaciation in various refugia, including Beringia and perhaps the Greenland area. Petersen (1963) indeed refers them all to a single subspecies, which he calls *P. bryoniae frigida* Scudder and I should call *P. napi hulda* Edwards (if *frigida* is properly an *oleracea* or mixed form). The close resemblance of all the arctic forms is attested by the confusion attached to Verity's types of *arctica* and *pseudobryoniae* (Müller and Kautz 1939:61–63), but the use of a single subspecific name may not be justified.

In America the north-south run of the mountain chains must have allowed a rather free movement of *Pieris* populations in response to the expansion and contraction of the area under the ice-sheet, but in central and northern Europe southward movement was limited by east-west ranges which were themselves glaciated. It is likely that the only pre-glacial *napi* which survived in western Europe occupied a varying territory in southern England, France and the intervening Channel-land (when it was exposed by eustatic changes in sea-level). This survivor may have been a dark-female insect forced down from the north—though such southward movement is conjectural. In the interglacial periods a more southern *napi* also may have moved up into France; in one such interglacial (or in the Allerød interstadial of the last glaciation) it entered Ireland from the south and was cut off there when the sea-level rose. Though other butterflies may have continued to enter Ireland by a persisting land-connection to Scotland, it is unlikely that many *napi* did so. Great Britain itself remained open to land-route immigration until about 10,000 years ago and so received in addition a *napi* immigration of slightly different constitution (possibly a later wave which entered Europe from the east when the Ukrainian route became passable).

Adalwinda-like *napi* now survives in the British Isles chiefly in Scotland and north and western Ireland, apparently everywhere attenuated by the introgression of white *napi* from the south. As in Scandinavia, there is no reproductive isolation from southern English *napi*, and there seems to be no biological justification for referring any Irish or Scottish *napi* to another species. Ssp. *britannica* (type from Co Cork!) will cover both Irish and Scottish, or the name *thomsoni* Warren (1968b) can be used for the Scottish subspecies—there are differences, perhaps in part associated with the more extreme climate of central and eastern Scotland, though how significant these are is still uncertain.

The position in Scandinavia has been well studied by Petersen (1947, 1949). A supposedly pure *adalwinda* still exists in the north, the clines of southward character-variation are long and an intermediate population has been given a separate subspecific name (*bicolorata* Petersen). It does not appear likely that isolating mechanisms are developing; the hybrid butterflies may be supposed to fit their hybrid environments (Anderson 1948).

Similarly in America the arctic insects referred to *P. napi hulda* are perhaps not even now reproductively isolated from the more southern subspecies (*oleracea*, etc.), so that clines exist in respect of the frequency of the distinctive characters, for example the breadth or the sharp definition of the underside veining. Warren (1968a) has described what appears to be a group of local forms on such a cline in south Alaska, under the name of *Pieris passosi*. If *hulda* and *oleracea* are

incipient species, the possibilities at any one locality are that adaptation of the hybrids will secure their permanence, or that isolating mechanisms will become more effective—and the pure species will then become sympatric or one will drive out the other. Local investigations are very desirable. Part of the nomenclatorial confusion which has affected supposed subspecies such as *frigida* may derive from the unsuspected naming of mixed colonies.

Typical Alpine *bryoniae* differs from *adalwinda* (or *hulda*) not only in appearance but also in a greater sexual isolation from *napi napi*. If *bryoniae* is less isolated on the south side of the Alps than on the north, as Petersen (1955) has shown, this does not necessarily imply that *bryoniae* resembles ssp. *meridionalis* more than it resembles ssp. *napi*. Stronger isolating mechanisms in the north could result from earlier contact there, providing a longer period for sexual isolation to develop. One supposes that the territory of *bryoniae* waxed and waned with the glaciers, but that the insect almost always remained attached to fir-woods and preferentially to a single food-plant (*Biscutella*), whereas *adalwinda*, like typical *napi*, was less specialised. It is even now too early to form a clear idea of the relation of *bryoniae* to the other subspecies; much more information is needed concerning the '*bryoniae*' of the Tatra, Carpathians and Caucasus, and particularly about the obscure *napi*-like subspecies of the Balkans, now being investigated by Lorković and by Warren. Here, as elsewhere, we have to consider the possibility that landscape alterations brought about by human activity in the last 10,000 years may have induced range-changes and so made opportunities for new hybridisations.

No single criterion should be used alone to decide relationship between allopatric subspecies. Where there are differences in chromosome-number, fixed within the subspecies, these may be regarded as *almost* self-sufficient—for example in *P. napi napi* $n=25$, in *P. virginiana* $n=26$ (Maeki & Remington 1960). But the chromosome-number of European *bryoniae* varies, even within single populations, from 25 to 28; in addition there is a variable small number of supernumerary m-chromosomes. This karyotypic heterogeneity can hardly be a mere consequence of the hybridisation with *napi* of some other insect of higher haploid number, since it is retained in certain Yugoslav populations of near-*napi* phenotype, whereas experimental *bryoniae-napi* hybrids rapidly lose the extra chromosomes when back-crossed to *napi* (Lorković 1970).

The solution of the enigma may lie in investigations among Anatolian, Persian and trans-Caspian populations. *Pieris melete* from Hokkaido has been reported (Maeki 1953) to have 27 to 31 pairs of chromosomes. One would like, too, to know n for the Atlas subspecies, especially *segonzaci* Le Cerf.

Thus for the European lepidopterist the centre of the *Pieris napi* controversy remains in *bryoniae*, though the problem is now different from that of even ten years ago.

SUMMARY

Discussion on the degree of separation of taxons within the *Pieris napi* group continues. The author prefers, for the present, to bring allopatric subspecies under wide species and retain the conventional trinomial. The speciation processes with whose results we are faced took place in the Pliocene and Pleistocene and are accessible only by inference from palaeogeography and the characters of surviving populations; human interference in the Recent has had minor effects. It is not possible to regard the whole of the group as conspecific, yet adjacent subspecies of different 'species' sometimes possess more characters in common than extreme geographic subspecies of one species. Visible characters, which

must be used in taxonomy, do not constitute the essence of the species.

Hybrid populations may be of several kinds, according to the time-scale involved. Some may present only the appearance of hybridity. The concept of the 'hybrid species', if it is retained, needs closer definition; there is no one certain means of recognising a hybrid population when the gene-pools have been re-integrated. Nomenclature should not rely too exclusively on theories of descent, which are liable to frequent change.

The accepted views of the origin and spread of *Pieris* are probably essentially correct. In America *P. virginensis* is a survivor from a very early immigration. *Oleracea* and other subspecies crossed the Bering land-bridge from Asia more recently. The circumpolar dark-female taxa had a common origin and became widespread in the north during interglacials; refugia were available in Beringia-Alaska and perhaps elsewhere.

The British Isles contain, in the north and west, remnants of the arctic dark-female *napi*. The lands were invaded from the south by two waves of whiter *napi*, which now occupy most territory. Likewise in Scandinavia there is a long cline, with a pure arctic form in the north and no reproductive isolation. Similar graded populations seem to exist in North America.

European *bryoniae* and *neobryoniae* remain enigmatic. Their variably high chromosome-number, shared by some adjacent quasi-*napi*, should be sought also in the Near East and Asia.

REFERENCES

- Anderson, E., 1948. Hybridisation of the habitat. *Evolution*, **2**:1-9.
 Beirne, B. P., 1943. Distribution and origin of the British Lepidoptera. *Proc. R. Irish Acad.*, **49**, B:27-59.
 —, 1952. *The Origin and History of the British Fauna*. London.
 Dixey, F. A., 1932. The plume-scales of the Pierinae. *Trans. ent. Soc. Lond.*, **80**:57-75.
 Edwards, W. H., 1881. On *Pieris bryoniae* Ochs. and its derivative forms in Europe and America. *Papilio*, **1**:84-99.
 Ford, E. B., 1945. *Butterflies*. London.
 —, 1964. *Ecological Genetics*. London.
 Howden, H. E., 1969. Effects of the Pleistocene on North American insects. *Ann. Rev. Entomol.*, **14**:39-56.
 Lorković, Z., 1928. Analiza pojma i varijabiliteta vrste na osnovi ispitivanja nekih lepidoptera (with German summary). *Glasn. Soc. sci. nat. croat.*, **38**:1-64.
 —, 1962. The genetics and reproductive isolating mechanisms of the *Pieris napi-bryoniae* group. *J. Lepid. Soc.*, **16**:5-19, 105-27.
 —, 1970. Karyologischer Beitrag zur Frage der Fortpflanzungsverhältnisse südeuropäischer Taxone von *Pieris napi* L. (with English summary). *Biol. Glasn.* In press.
 Maeki, K., 1953. Chromosome number of some butterflies. *Jap. J. Genetics*, **28**:6-7.
 Maeki, K. and C. L. Remington, 1960. Studies of the chromosomes of North American Rhopalocera. *J. Lepid. Soc.*, **14**:37-57.
 Mayr, E., Linsley, E. G. and Usinger, R. L., 1953. *Methods and Principles of Systematic Zoology*. New York.
 Müller, L. and Kautz, H., 1939. *Pieris bryoniae* O. und *Pieris napi* L. Vienna.
 Petersen, B., 1947. Die geographische Variation einiger fennoskandischer Lepidopteren. *Zool. Bidr. Upps.*, **26**:329-531.
 —, 1949. On the evolution of *Pieris napi* L. *Evolution*, **3**:269-78.
 —, 1954. Some trends in the speciation of the cold-adapted Holarctic fauna. *Zool. Bidr. Upps.*, **30**:233-314.
 —, 1955. Geographische Variation von *Pieris (napi) bryoniae* durch Bastardierung mit *Pieris napi*. *Zool. Bidr. Upps.*, **30**:355-97.

- , 1958. *Pieris napi* and *Pieris bryoniae*, two 'Siamese twin species'. *Uppsala Univ. Årsskr.* in **6**:224-30.
 —, 1963. Breakdown of differentiation between *Pieris napi* L. and *bryoniae* Ochs. and its causes. *Zool. Bidr. Upps.*, **35**:205-62.
 Rand, A. L., 1948. Glaciation, an isolating factor in speciation. *Evolution*, **2**:314-21.
 Verity, R., 1928. Essay on the origins of the geographical variations of the Rhopalocera in Europe. . . . *Ent. Rec.*, **40**:97-101.
 —, 1947. *Le Farfalle Diurne d'Italia*, **3**. Firenze.
 Warnecke, G., 1958. Origin and history of the insect fauna of the northern Palaearctic. *Proc. 10th int. Congr. Ent.* (1956), **1**:719-39.
 Warren, B. C. S., 1961. The androconial scales and their bearing on the question of speciation in the genus *Pieris*. *Ent. Tidskr.*, **82**:121-48.
 —, 1963. *Pieris bryoniae dubiosa* Röber, and . . . variation in the androconia of *Pieris* species. *Ent. Rec.*, **75**:125-9.
 —, 1965. Affinities and distribution of various Pierid species. *Ent. Rec.*, **77**:121-9.
 —, 1966. Nature and origin of certain races of . . . *Pieris*. *Ent. Rec.*, **78**:57-65.
 —, 1967. Supplementary data on androconial scales of some Holarctic . . . *Pieris*. *Ent. Rec.*, **79**:139-43.
 —, 1968a. On the Nearctic species of the *bryoniae*- and *oleracea*-groups of . . . *Pieris*. *Ent. Rec.*, **80**:61-6.
 —, 1968b. On an unstable race of *Pieris adalwinda* . . . in Scotland. *Ent. Rec.*, **80**:299-302.
 —, 1969. On the discovery of a fourth hybrid race among Palaearctic . . . *Pieris*. *Ent. Rec.*, **81**:225-31.
 Wiltshire, E. P., 1962. Theories of the origin of the west Palaearctic and world faunae. *Ent. Rec.*, **74**:29-39.
 Zeuner, F. E., 1942. Two new fossil butterflies of the family Pieridae. *Ann. Mag. nat. Hist.* (11), **9**:409-16.

53, Crouch Hall Lane,
 Redbourn, Herts.

4th April 1970

FIELD MEETING

CHOBHAM COMMON, SURREY—17th May 1969

Leader: Mrs. F. M. MURPHY

The leader and her husband were joined by another member, who hailed from the north, and took a surprisingly cheerful view of the dull, windy weather and the intermittent rain. We walked down to the stream in the Long Arm and collected in the bog nearby. After lunch we went to the boggy area near Burrowhills.

Of the spiders taken *Dipoena inornata* (O.P.-Camb.) and *Singa sanguinea* C. L. Koch were very local and *Zilla diodia* Walck. is uncommon.

Spiders recorded were: *Phrurolithus festivus* C. L. Koch, *Euophrys frontalis* (Walck.), *Theridion pallens* Blackwall, *Araneus redii* (Scop.), *Dictyna arundicanea* (L.), *Drassodes lapidosus* (Walck.), *Clubiona reclusa* O.P.-Camb., *Salicus cingulatus* (Panz.), *Lycosa hortensis* Thorell, *Pirata hygrophilus* Thorell, *Episinus angulatus* (Blackwall), *Dipoena inornata* (O.P.-Camb.), *Theridion vittatum* C. L. Koch, *T. sisypium* (Clerck), *Tetragnatha obtusa* C. L. Koch, *Zilla diodia* Walck., *Singa sanguinea* C. L. Koch, *Gongylidium rufipes* Sundervaal, *Pocadicnemis pumila* (Blackwall), *Oedothorax gibbosus* (Blackwall), *Bathyphantes pullatus* (O.P.-Camb), and *Poeciloneta globosa* (Wider).

ZYGAENA FABRICIUS (LEP., ZYGAENIDAE) FROM TURKEY

By W. G. TREMEWAN

In July, 1969, I was very fortunate to join an entomological expedition to Turkey, which was being led by Mr. Douglas Cottrill. Our main objective was to collect Rhopalocera and the genus *Zygaena*. In addition, a large number of insects of other orders, mainly Orthoptera, Coleoptera and Hymenoptera, were collected and these are now preserved in the British Museum (Natural History) collections.

Although we occasionally relied upon hotels for accommodation and food, much of our time was spent in a caravan which we had taken across Europe, consequently we were able to collect in more remote areas than otherwise might have been possible. However, we were disappointed to find the Taurus Mountains in the neighbourhood of Maraş very poor for all groups of insects and, as the vegetation in the southern part of Turkey generally was burnt brown with the sun, combined with the almost total absence of plants in bloom, we came to the conclusion that it would have been more profitable in this area at an earlier date. The best collecting locality was near the village of Beynam, some 40 km to the south of Ankara, where no less than nine species of *Zygaena* were recorded from one mountain slope. Here, many species of Rhopalocera were taken and other orders were well represented.

One of our biggest disappointments in Turkey was the paucity of insects of all orders in many areas and one had to drive many miles and spend much time before a good locality was found. Similar observations were made by Guichard & Harvey (1967:228). As elsewhere, much of the Turkish landscape is rapidly changing and it is inevitable that much of its ecology will alter with the rapid expansion of towns and villages in some areas, and with improved methods of agriculture. Large scale afforestation in many areas is also destroying many interesting localities.

Although brief ecological notes and descriptions of biotopes are given below, it might be appropriate here to mention a few general remarks on field observations. In Turkey, all species of *Zygaena* are extremely active and many have a fast and direct flight, consequently a net is a necessity to facilitate their capture. Almost without exception most species were observed to feed as imagines at a white-flowered scabious, tentatively determined as *Scabiosa ucranica* L., and were rarely observed visiting other flowers. During the late afternoon and evening many species, but especially *carniolica* Scopoli, were observed to rest on these scabious flowers in preference to other vegetation. The biology of the Turkish *Zygaena* is little known and as we found no larvae it is difficult to ascertain the foodplants. Cocoons of only *carniolica* and *laeta* Hübner were found and these species do not as a general rule spin high up but conceal their cocoons amongst the vegetation near the ground. Even *filipendulae* Linnaeus appears to conceal its cocoon as an hour's searching revealed none in a locality where the species was abundant.

The following notes, which supplement those of Holik & Sheljuzhko (1953 *et seq.*) and Tremewan (1968; 1969), are based on the material collected by Mr. Douglas Cottrill, his two sons David and Robin, and myself. I am indebted to them for their untiring efforts in obtaining many specimens for me. Most of the material, including the types, is now preserved in the W. G. & S. M. Tremewan collection; the remainder is in the D. Cottrill collection.

Although much of the material is referable to named subspecies, there are six new and distinct subspecies which are here described. As noted below, some species, including *punctum* Ochsenheimer and *laeta*, form local races which in my

opinion are not worthy of separation; they are here referred to the nearest subspecies.

Zygaena laeta akschhirensis Reiss
1929, *Int. ent. Z.*, 23:151

ANKARA: Beynam, south of Ankara, ca 1000 m, 14–16.vii.69, seven males, one female.

ANKARA: Balâ, south of Ankara, ca 1000 m, 13.vii.69, one male, one female (in copula).

Holik & Sheljuzhko (1953:223) stated that the populations of Asia Minor form local races which are all near to ssp. *orientis* Burgeff, described from Bogdanzi and Nicolic in the Dojran Lake district of Macedonia. At present, I can see no justification in describing the Ankara specimens as new for, apart from forming local races, as stated above, the species varies little over the whole of its range in Turkey. The populations of *laeta* occurring south of Ankara are therefore referred to ssp. *akschhirensis* Reiss, described from the Akşehir region.

Bionomy

Collected east of the village of Beynam on the northern slopes of a range of mountains to the south of Ankara. This area proved to be the richest in *Zygaena* species, no less than nine species being captured here. The species *purpuralis* Brünnich and *araratensis* Reiss were taken on the previous trip by Cottrill (Tremewan, 1968:55), making the total of eleven species for this area; in spite of intensive searching neither were observed in 1969.

A pair of *laeta* in copula were found sitting on the cocoon of the female on 14th June; the cocoon was spun up on a grass stem. A second cocoon found on the same day was attached to a grass-head. From a cocoon found on the 12th July, a number of hymenopterous parasite *Brachyneria intermedia* (Nees) eventually emerged.

The larva feeds on *Eryngium* and two species, *E. campestre* L. and *E. dichotomum* Desf. were common.

The terrain near the village of Balâ, which lies to the east of Beynam, is similar to that of the latter, but flowers were not so abundant, neither was the area so good for insects generally.

Zygaena punctum anatoliensis Reiss
1929, *Int. ent. Z.*, 23:148

ANKARA: Balâ, south of Ankara, ca 1000 m, 11–13.vii.69, three males, four females.

ANKARA: Beynam, south of Ankara, ca 1000 m, 1–16.vii.69, seventeen males, three females.

ANKARA: Lalahan, 23 km east of Ankara, ca 850 m, 15.vii.69, two males, one female.

ANKARA: Elmadağ, east of Ankara, ca 1800 m, 15.vii.69, one male, two females.

Z. punctum Ochsenheimer is widely distributed in Asiatic Turkey and tends to form local races. However, the specimens recorded above are all referred to ssp. *anatoliensis* Reiss, described from the neighbourhood of Akşehir, 1000–1500 m, and have the characteristic confluent and suffused forewing streaks of this subspecies.

Bionomy

An active species, occasionally visiting the white-flowered scabious (*Scabiosa ucranica*), but more often taken on the wing. *Eryngium*, the foodplant of the larva, was noted in all localities.

Zygaena punctum Ochsenheimer ssp.

KIRKLARELİ: Yenibedir, south-east of Lüleburgaz, 29.vi.69, four males, four females.

Differs from ssp. *anatoliensis* Reiss in the dull red coloration of the forewing streaks and hindwings; the confluence of the forewing streaks is not so strong and is without the suffusion of red scaling.

Bionomy

Captured on uncultivated ground along the roadside. *Eryngium campestre* and *E. amethystinum* L. were common.

Zygaena araratensis Reiss ssp.

1935, Int. ent. Z., 29:139

SIVAS: Saylar Pass (north side), south-west of Sivas, ca 1850 m, 19.vii.69, two females.

One female is aberrant and has the forewing streaks suffused and confluent, so that the ground colour remains only as a narrow border from the middle of the costa to the base of the inner margin.

Zygaena diaphana anadolica ssp. nov.

ANKARA: Beynam, south of Ankara, ca 1000 m, 1-14.vii.69, thirteen males, twenty-five females.

Male: 27-32 mm wingspan. Forewing ground colour bluish black with a slight greenish sheen; forewing streaks and hindwings light crimson, streaks broad, occasionally confluent; hindwing border represented only at apex, or absent.

Female: 29-33 mm wingspan. Similar to the male, but forewing ground colour occasionally dusted with yellowish scaling, sheen stronger; forewing streaks broader, more often confluent; hindwings similar to those of the male. Tegulae black mixed with whitish, black only in the male.

Holotype male, allotype female, Beynam, 2.vii.69.

Paratypes: 12 males, 24 females, Beynam, 1-14.vii.69; 1 male, Beynam, 25.vi.67; 1 female, Beynam, 14.vii.67.

This very distinct subspecies differs from the nominate subspecies from Hadjin (Saimbeyli), 2000 m, in the thicker scaling, stronger and less translucent coloration, and the larger size.

Bionomy

Occasionally captured whilst in flight, but also at rest on herbage or visiting various flowers. In Europe the larva of this species feeds on *Pimpinella saxifraga* L.; a *Pimpinella* species was noted in abundance in the Beynam locality.

Zygaena diaphana Staudinger ssp.

SIVAS: Saylar Pass (north side), south-west of Sivas, ca 1850 m, 19.vii.69, two males, seven females.

According to this rather limited material, similar to the specimens from Beynam.

Bionomy

A *Pimpinella* species was growing in abundance where the specimens were captured and is probably the foodplant of the larva.

Zygaena formosa eximia ssp. nov.

ANKARA: Balâ, south of Ankara, ca 1000 m, 11–13.vii.69, thirteen males, four females.

ANKARA: Beynam, south of Ankara, ca 1000 m, 12–16.vii.69, three males.

Male: 22–26 mm wingspan. Antennae, head and thorax black; patagia white, sparingly mixed with rose-pink, tegulae black with white tips; abdomen black with a rose-pink belt on two or three segments, legs greyish white. Forewing ground colour black with a slight bluish or greenish sheen, forewing spots rose-pink, edged with whitish cream, spots 1 and 2 confluent, spot 2a absent or vestigial, spots 3 and 4 separate but confluent by the cream edging; in five specimens confluent; hindwings rose-pink, hindwing border black, present only at apex and as a tooth-shaped mark between apex and tornus.

Female: 24–27 mm wingspan. Similar to the male but edging of forewing spots broader, less pink coloration in the patagia; tegulae whiter than those in the male.

Holotype male, allotype female, Balâ, 11.vii.69.

Paratypes: 12 males, 3 females, Balâ, 11–13.vii.69; 3 males, Beynam, 12–16.vii.69.

Compared with the nominate subspecies from Amasya, the new subspecies differs in the broader whitish cream edging of the forewing spots, the patagia which are whiter than in ssp. *formosa* Herrich-Schäffer, the narrower hindwing border, and the legs, which are greyish white compared with brownish yellow.

Bionomy

This species flies with a rapid flight close to the ground and is not easily captured. Only occasionally to be seen at rest on the white flower heads of *Scabiosa ucranica*.

Zygaena ganymedes freyeriana Reiss stat. nov.

1933, Ent. Rdsch., 50:221, pls. 1, 2

ÇORUM: north-east of Çorum, ca 770 m, 21.vii.69, one male, seven females.

TOKAT: Kızılınlı Pass (north side), south of Tokat, ca 1150 m, 19.vii.69, one female.

ANKARA: Beynam, south of Ankara, ca 1000 m, 2–16.vii.69, two males, two females.

ANKARA: Balâ, south of Ankara, ca 1000 m, 11.vii.69, five males, three females (including a pair in copula).

ANKARA: Lalahan, 23 km east of Ankara, ca 850 m, 15.vii.69, three males, four females.

ANKARA: Elmadağ, east of Ankara, ca 1800 m, 15.vii.69, two males, three females.

Reiss separated this species from *ganymedes* Herrich-Schäffer by the greyish or whitish scaling on the antennae, this scaling occurring from the base of the antenna to just before the club. Holik & Sheljuzhko (1956:128) pointed out that this greyish scaling is not always present. According to the series of specimens recorded above it is in fact a very variable character and is strongly represented in nine specimens only out of a series of 33; an examination under the microscope

of all specimens in which the greyish scaling appears to be absent shows it to be present.

The four specimens (two males, two females) which I previously recorded from Beynam (Tremewan, 1968:55) as *ganymedes* have 'black' antennae; it is now apparent that they should be referred to *freyeriana*. The male recorded from Sırıklı, near Merzifon (Amasya) (Tremewan, 1969:109) was correctly determined and has greyish antennae.

The study of this material raises doubts as to whether *freyeriana* is specifically distinct from *ganymedes*; in my opinion it is no more than a subspecies.

The specimens show some variation in the breadth of the yellowish cream edging of the forewing spots; in a female from Elmadağ the cream edging is suffused and confluent within the spot area.

Bionomy

An active species, but frequently to be taken when visiting flowers of *Scabiosa ucranica*. Staudinger (1879:324) recorded the larval foodplant as *Astragalus echinus* DC.; in all the biotopes where the species was found, an *Astragalus* species was noted.

A female from a pair captured in copula at Çorum oviposited on 23rd July. The ova were deposited in a single layer and, unlike those of British species, were not laid flat but on end, the transparent pole being uppermost. Ovoid in shape, pale yellow in colour, one pole (uppermost) transparent, abdominal scales of female adhering to ova.

The ova hatched on 31st July but most of the larvae, which were offered *Trifolium* and *Lotus corniculatus* L. and only accepted the latter, died in the first instar. About half the larvae were given to Dr. G. Reiss who, at the time of writing, has only one larva left and this is now in hibernation.

Zygaena carniolica amasina Staudinger
1879, *Horae Soc. ent. Ross.*, 14:326

AMASYA: Akören, east of Amasya, 20.vii.69, two females (worn).

ÇORUM: north-east of Çorum, ca 770 m, 21.vii.69, four males, fifteen females.

One female from Akören has the red abdominal belt two segments broad; the abdominal belt of the other is five segments broad.

The specimens from east of Çorum also show considerable variation in the abdominal belt which varies from two to five segments broad in both sexes. The cream edging of the forewing spots is also variable and in three females is suffused and almost obliterates the dark ground colour.

Bionomy

Taken in both localities feeding at the flowers of *Scabiosa ucranica*.

Zygaena carniolica tokatensis ssp. nov.

TOKAT: Kızılınlı Pass (north side), south of Tokat, ca 1150 m, 19.vii.69, six males, eleven females.

SIVAS: Çamlıbel Pass (south side), north of Yıldızeli, ca 1646 m, one male, ex pupa, 20.vii.69.

SIVAS: Saylar Pass (north side), south-west of Sivas, ca 1850 m, 19.vii.69, one male.

Male: 25–27 mm wingspan. Differs from ssp. *amasina* Staudinger and ssp. *atatuerki* ssp. nov. in the smaller forewing spots, the reduced whitish cream

edging, and the colder and duller, almost crimson coloration of the forewing spots and hindwings. The abdominal belt varies from two to three segments broad dorsally and is not well represented on the underside.

Female: 25–30 mm wingspan. As in the male.

Holotype male, allotype female, Kızılıniş Pass, 19.vii.69.

Paratypes: 5 males, 10 females, with the same data.

The two specimens from Sivas are provisionally referred to this subspecies. The male from the Saylar Pass is similar but the abdominal belt is considerably broader. The male ex pupa from the Çamlıbel Pass is probably an aberration and has yellow edging to the forewing spots of which spots 5 and 6 are confluent, while the red abdominal belt is reduced and mixed with black.

It is worth noting that Holik & Sheljuzko (1956:218) considered that, according to the material available to them, the populations from near Tokat were not referable to ssp. *amasina*.

Bionomy

Captured near the top of the Pass on the north side. The species frequented rough ground between the roadside and cultivated areas; all specimens were taken in the late afternoon at rest on flower heads of *Scabiosa ucranica*. On the Çamlıbel Pass two cocoons were collected; the moth from one of these had already emerged, from the other a male emerged on 20th July.

Zygaena carniolica atatuerki ssp. nov.

ANKARA: Beynam, south of Ankara, ca 1000 m, 12–16.vii.69, 58 males, 24 females (including one female ex pupa, 13.vii.).

ANKARA: Balâ, south of Ankara, ca 1000 m, 11–16.vii.69, 23 males, eight females.

Male: 25–30 mm wingspan. Differs from ssp. *amasina* Staudinger by the reduction of the cream edging of the forewing spots and the generally brighter vermillion coloration of the forewing spots and hindwings.

Female: 25–30 mm wingspan. As in the male.

Holotype male, Beynam, 14.vii.69; allotype female, Beynam, 12.vii.69.

Paratypes: 57 males, 22 females, Beynam, 12–16.vii.69; 7 males, 1 female, Beynam, 14.vii.67; 23 males, 8 females, Balâ, 11–16.vii.69.

This new subspecies was provisionally placed under ssp. *amasina* Staudinger (Tremewan, 1968: 56) but further material has shown that it differs in the breadth of the cream edging of the forewing spots, which is narrower than that in ssp. *amasina*. This cream edging is variable, however, and in four females is suffused and confluent. The abdominal belt also varies from two to seven segments broad dorsally. A female, ex pupa, 13.vii. from Beynam, has segments 2–4 yellowish brown, the remaining segments except the eighth being dark pink.

Bionomy

This was the commonest species at Beynam, and in this locality and at Balâ, was taken feeding at the flowers of *Scabiosa ucranica*, where it also rested during the late afternoon and evening. Although nine cocoons were found spun up on grass stems, and one on a leaf of *Eryngium*, it is evident that the majority were concealed amongst the herbage near the ground. A single cocoon was found in the Balâ locality.

From one cocoon a number of the hymenopterous parasite *Monodontomerus viciellae* Foerster emerged.

Zygaena carniolica suavis Burgeff
1926, *Mitt. münchen. ent. Ges.*, 16:62

MARAŞ: Maraş to Göksun, ca 60 km from Maraş, 7.vii.69, three males, four females (worn).

Described from Maraş, Hadjin (Saimbeyli) and Zeitun (Süleymanlı).

Bionomy

These worn examples were taken at the flowers of *Scabiosa ucranica* in a small patch of uncultivated ground surrounded by newly planted vineyards.

Zygaena loti anatolica Burgeff
1926, *Mitt. münchen. ent. Ges.*, 16:37

KONYA: south of Karaman, 5.vii.69, one female (worn).

This female is in very poor condition, the forewings being almost devoid of scales; the only obvious characteristic is its small size—wingspan 24 mm.

Zygaena loti beynamensis ssp. nov.

ANKARA: Beynam, south of Ankara, ca 1000 m, 1–14.vii.69, four males, four females.

Male: 26–29 mm wingspan. Nearest to ssp. *anatolica* Burgeff but differs from this subspecies and ssp. *pontica* Holik & Sheljuzhko in the forewing spots which are more inclined to confluence; spots 1 and 2 confluent with spots 3 and 4, spots 5 and 6 separate from or narrowly confluent with spot 1 which is extended along the costa.

Female: 28–30 mm wingspan. The females are remarkable for the reduction in confluence of the forewing spots when compared with the males.

Holotype male, Beynam, 1.vii.69; allotype female, Beynam, 12.vii.69.

Paratypes: 3 males, 3 females, Beynam, 1–14.vii.69; 3 males, 2 females, 25.vi.–1.vii.67.

This new subspecies was provisionally referred to ssp. *pontica* Holik & Sheljuzhko (Tremewan, 1968:56). It should be noted that Holik & Sheljuzhko (1955: 146) stated that the Ankara populations appeared not to belong to ssp. *anatolica* Burgeff.

Zygaena loti Denis & Schiffermüller ssp.

SIVAS: Saylar Pass (north side), south-west of Sivas, ca 1850 m, 19.vii.69, one male, seven females.

Differs from ssp. *pontica* Holik & Sheljuzhko from Amasya in the thicker scaling and the brighter, less translucent red coloration of the forewing spots and hindwings. In the male and two females the forewing spots are confluent.

Zygaena dorycnii wagneriana Reiss
1929, *Int. ent. Z.*, 23:151

ANKARA: Beynam, south of Ankara, ca 1000 m, 12–16.vii.69, three males, two females.

KONYA: south of Karaman, 5.vii.69, one male.

KONYA: Sertavul Pass, south of Karaman, ca 1600 m, 5.vii.69, one male.

These specimens are provisionally referred to ssp. *wagneriana* Reiss, which was described from Sultandağı near Akşehir, 1300–1700 m.

Bionomy

This is one of the most active species of *Zygaena* that we encountered and, because of its wild and rapid flight, sometimes at a great height, is often very

difficult to capture. It was rarely to be seen visiting flowers or at rest on herbage. When seen on the wing its dark appearance rendered it easily distinguishable from *filipendulae*.

Zygaena dorycnii Ochsenheimer ssp.

AMASYA: Akören, east of Amasya, 20.vii.69, five males, two females.

ÇORUM: north-east of Çorum, ca 770 m, 21.vii.69, one male (worn).

These specimens probably represent an undescribed subspecies, the description of which awaits further material. They differ from the specimens from Ankara and Konya in the warmer red coloration of the forewing spots and hindwings, and in the larger forewing spots. The forewings are longer and broader, especially in the females. The abdominal belt is one segment broad dorsally; one male has a suffusion of red scaling on the dorsal surface of the abdomen anterior to the belt.

This species was recorded by Staudinger (1879:322) from Amasya and Tokat as *peucedani* Esper; the above specimens appear to be the first to be noted since that date.

Bionomy

The Amasya specimens were collected near the village of Akören; because of their rapid flight and the rough terrain only about half of the total number seen was taken.

Zygaena filipendulae superflua ssp. nov.

NEVŞEHİR: 8 km west of Ürgüp, ca 1200 m, 10.vii.69, 33 males, 28 females.

Male: 29–35 mm wingspan. Forewing spots confluent in pairs, in eleven males spots 5 and 6 separate, spots and hindwings bright crimson; hindwing border variable but well represented, occasionally broad at apex and between apex and tornus; forewing ground colour with a strong green or blue-green sheen. An aberrant but worn male has the forewing spots confluent in pairs while spot 2 is connected to spot 4 by a broad, red bar.

Female: 29–37 mm wingspan. In only two females are spots 5 and 6 completely separate; the general tendency is for the forewing spots to be large and confluent in pairs; in two females there is a slight suffusion of red scaling connecting the pairs. Forewing ground colour with a strong greenish sheen, forewing spots and hindwings light crimson, hindwing border very narrow or absent.

Both sexes have a strong suffusion of red scaling in the spot area on the underside.

I consider specimens with spots 5 and 6 confluent, and 3 and 4 narrowly separated, to be representative of the subspecies.

Holotype male, allotype female, 8 km west of Ürgüp, 10.vii.69.

Paratypes: 32 males, 27 females, with the same data.

Differs from ssp. *anodolitia* Reiss, described from Akşehir, in the greater tendency for spots 5 and 6 to be confluent, and in the somewhat broader hindwing border.

Bionomy

The specimens were collected in a small marshy area where *Juncus* and other bog vegetation grow. The species was abundant at the flowers of a thistle (?*Cirsium* sp.) and several pairs were noted in copula. No cocoons were seen even when a search was made low down in the herbage under pairs in copula. It is evident that the cocoon is spun low down and well concealed and this

appears to be true for all the Turkish populations of *filipendulae*. The foodplant, *Lotus corniculatus* L., was abundant but confined to the marshy area.

Zygaena filipendulae anodolitiae Reiss
1929, Int. ent. Z., 23:152

ANKARA: Beynam, south of Ankara, ca 1000 m, 1-2.vii.69, two males, seven females.

Although I originally referred the Beynam populations of *filipendulae* to ssp. *anodolitiae* Reiss (Tremewan, 1968:56), this additional material suggests that they represent a new subspecies. The description awaits further material.

This appears to be a variable subspecies in which the forewing spots are enlarged and confluent in pairs. In two worn females the spots are very large and confluent.

Bionomy

This species occurred in two localities near Beynam but did not appear to be abundant. In both localities it frequented damp areas at the bottom of small valleys where the vegetation was lush and green compared with the surrounding countryside. Only here was the foodplant *Lotus corniculatus* to be found growing. Occasionally *filipendulae* strayed away on to the drier ground but such specimens were usually worn. No cocoons were noted.

Zygaena filipendulae akdaghi Holik & Sheljuzhko
1958, Mitt. münchen. ent. Ges., 48:185

AMASYA: Akören, east of Amasya, 20.vii.69, five males, seven females.

Described from Akdağ, Amasya. The specimens from Akören agree with the original description of ssp. *akdaghi* Holik & Sheljuzhko except that the hindwing border is somewhat broader.

Bionomy

The specimens were taken feeding at the blossoms of bramble (*Rubus* sp.) growing beside a small stream in open pine woods.

Zygaena filipendulae Linnaeus ssp.

SIVAS: Çamlıbel Pass (south side), north of Yıldızeli, ca 1646 m, 19.vii.69, one female (worn).

Forewing spots confluent in pairs, hindwing border well represented.

Zygaena filipendulae daghana Holik & Sheljuzhko
1958, Mitt. münchen. ent. Ges., 48:185

ÇANKIRI: Pass on road from Güvem to Çerkeş, 17.vii.69, two males, one female.

BOLU: Lake Abant, ca 1000 m, 23.vii.69, two males, one female.

The Cankırı specimens agree with the original description of ssp. *daghana* Holik & Sheljuzhko, described from Kastamonu, except that the red suffusion of scaling is well represented in the spot area on the underside of one male.

The Bolu specimens are similar and were captured in a similar biotope.

Bionomy

In both localities the specimens were collected in damp clearings in pine woods where the foodplant, *Lotus corniculatus*, was present.

Zygaena filipendulae Linnaeus ssp.

KIRKLARELİ: Yenibedir, south-east of Lüleburgaz, 29.vi.69, two males, one female.

Bionomy

Collected in a damp area along the roadside where *Lotus corniculatus* was growing.

Zygaena lonicerae Scheven ssp.

AMASYA: Akören, east of Amasya, 20.vii.69, one male, two females (worn).

Z. lonicerae Scheven is apparently either rare or overlooked in Turkey, and there are very few records. According to Holik & Sheljuzhko (1958:217) the species is sparingly distributed in Asia Minor. Lederer (1855:241) stated that the species was found by Kindermann near Amasya and Tokat; there do not appear to be any further records from these areas until now.

The specimens have long, narrow forewings; forewing spots of normal size, hindwing border broad from apex to before tornus.

Bionomy

Taken flying in the same area as *Z. dorycnii* Ochsenheimer.

Zygaena lonicerae Scheven ssp.

ÇANKIRI: Pass on road from Gümüş to Çerkeş, 17.vii.69, one female.

This is apparently the first record of this species from the province of Çankırı.

Differs from the Amasya specimens in the broader forewings, with a more rounded apex.

Bionomy

Taken where the food plant, *Lathyrus pratensis*, was growing beside a stream running through a clearing in pine woods.

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REFERENCES

- Lederer, J., 1855, Beitrag zur Schmetterlings-Fauna von Cypern, Beirut und einem Theile Klein-Asiens, *Verh. zool.-bot. Ver. Wien*, **5**:177–254, pls. 1–4.
 Guichard, K. M. & Harvey, D. H., 1967, Collecting in Turkey 1959, 1960 & 1962, *Bull. Br. Mus. (nat. Hist.) Ent.*, **19**(4):223–250.
 Holik, O. & Sheljuzhko, L., 1953, Über die Zygaenen-Fauna Osteuropas, Kleinasiens, Irans, Zentralasiens und Sibirien, *Mitt. münchen. ent. Ges.*, **43**:102–26.
 —, 1955, *Ibidem*, **44/45**:26–158.
 —, 1956, *Ibidem*, **46**:93–239.
 —, 1957, *Ibidem*, **47**:143–85.
 —, 1958, *Ibidem*, **48**:166–285.
 Staudinger, O., 1878/9, Lepidopteren-Fauna Kleinasiens, *Horae Soc. ent. Ross.*, **14**:176–482.
 Tremewan, W. G., 1968, On a small collection of *Zygaena* Fabricius (Lep., Zygaenidae) from Turkey, *Proc. Brit. ent. nat. Hist. Soc.*, **1**:54–6.
 —, 1969, Further records of *Zygaena* Fabricius (Lep., Zygaenidae) from Turkey, *Proc. Brit. ent. nat. Hist. Soc.*, **2**:103–6.

**LARVAE OF THE BRITISH LEPIDOPTERA NOT FIGURED
BY BUCKLER**

PART XI

Compiled and illustrated by G. M. HAGGETT

This part contains descriptions of the larvae of two moths that share a similar and equally remarkable history in Britain, in that both had not been recorded for over 100 years. But whereas *Coenophila subrosea* Steph. had been formerly locally plentiful within the Huntingdonshire fens before drainage, the records of *Trisateles emortualis* Schiff. were so few as to be suspect. In very recent years both species have been rediscovered in Britain and found to be breeding in numbers, *C. subrosea* in a very different habitat in west Wales, but *T. emortualis* in the same district that produced the original records. One of the two *Zygaena* species also in this part had also been lost for a number of years and this has now been found again in a locality about as far removed from the original as could be in Britain.

Collectors have always shown their great surprise not that such happenings should ever occur, but that they should occur so frequently in a country where the lepidopterous fauna was reckoned to be so well known. In fact we now expect the opposite because the very appearance of such insects as *T. emortualis* and *Xanthorhoe biriviata* Borkh. in the most densely populated part of the country merely underlines just how little explored are the many facets of this ever-changing fauna and how absurd it is to think that every environment has been investigated. Only in very modern times have we begun to understand how the discovery of almost any localised insect is due to chance and that for every discovery made how many others still await that chance.

Coenophila subrosea Stephens Rosy Marsh Moth

The rediscovery in Britain of *C. subrosea* is probably the most spectacular of all the astonishing post-war collecting surprises. It is all the more remarkable for having been found in a part of the country so far removed from the old fenland locality, and in so different a habitat. Students of the origins of our lepidopterous fauna could have supposed that the former fenland populations had been remnants of the one-time Doggerland and able to survive in Britain only in alkaline peat-fen conditions (e.g. Beirne, 1953, *Ent. Gaz.*, 4:297) in contrast to the more usual acid moorland sites which the insect frequents today throughout its extensive range abroad; and now the moth has again been found in Britain in abundance in a maritime Welsh acid peat-bog.

At the time of writing Borth bog remains the only locality that is well worked, but there are similar situations in Merionethshire and Cardiganshire, so it will be surprising if other breeding grounds are not discovered, although it must be remembered that it is only in a very restricted area of the fenlands that the species was formerly found. Actually the original 1965 specimen was taken further north, near Penrhynedd, but it must be accepted that as this first moth was taken near a railway goods yard accidental transportation was possible. Gardiner (1968, *Ent. Gaz.*, 19:251) suggests the possibility—albeit on circumstantial evidence—that Weaver's 1828 specimen could have come from Wales.

At first it was thought that these Borth moths were smaller and greyer than the old fen insects, but the great many Welsh examples reared and caught since have produced a range of size and colour shades; although the Welsh ones are

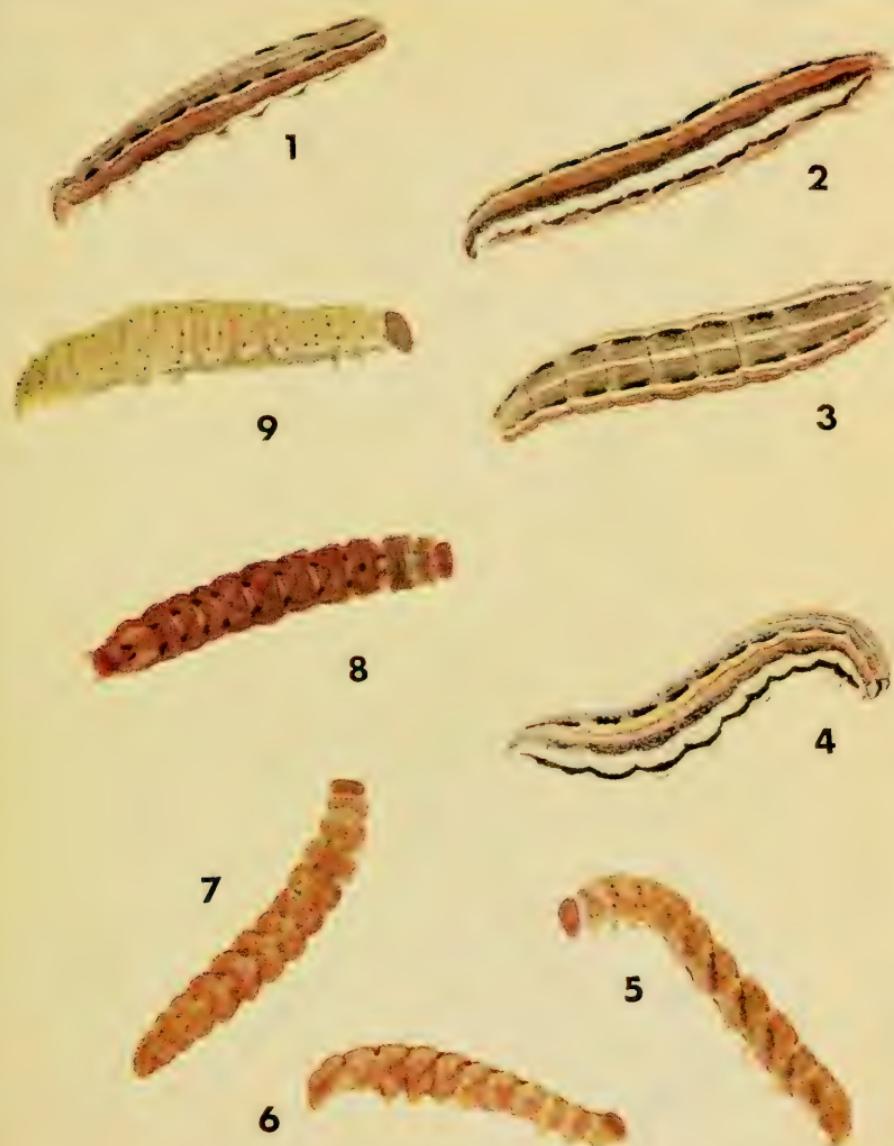
frequently smaller than the best of the preserved fen moths (and only the best remain in collections today) the colour range of bred Welsh specimens in predominantly some shade of red or pink that includes deep rose and velvety claret.

In Gardiner's review (*loc. cit.*) two long-standing literary inaccuracies are corrected. First the date of the fenland discovery is established as 1828 and not 1837. Second the former fenland distribution is clarified to exclude Cambridgeshire, all Whittlesea data being referred to Whittlesea Mere in Huntingdonshire. Gardiner points out that Hulme (1958, *Ent. Rec.*, 70:41–43) found records of the species from Derbyshire after the last specimens were recorded from Hunts.; there were indeed two of these Derbyshire records, both from Easton, one in 1857 and the other a few years later.

Gardiner also discusses foodplants and regards *Myrica gale* L. as the only likely wild food of the larva in Britain; he also suggests the burning of fen vegetation to be the most likely cause of the moth's disappearance rather than drainage. Wightman and Odd however, have noted at Borth that burning of the Bog Myrtle along with the superficial bog overgrowth may actually be beneficial to this species; these two workers have spent a deal of time in the last two years exploring Borth bog from all directions both in daylight and at night, and they have formed the opinion that the larvae of *C. subrosea* are only to be found in plenty in those parts of the bog that are from time to time swept by fire and thus kept open. They found large areas that appeared suitable but which were overgrown as a result of the fire not reaching them and on such terrain they found many larvae of other species, but none of this; and on areas where the fires had been fairly recent and the old growth of *Myrica* badly burned there was still plenty of young growth down in the wet moss. The moth is at present in extraordinary abundance, it is subject to attack by several hymenopterous parasites and Chalmers-Hunt (1969, *Ent. Rec.*, 81:179) has recorded some of these and a virus disease.

Like other *Amathes* larvae (for this species belongs sensibly to that genus) the overwintered larva of *subrosea* comes up after dark to feed, and on favourable evenings can be found actually in fading daylight. At Borth it feeds in spring on the young leaves of *Myrica* but it takes readily in captivity to smooth-leaved varieties of willow. In the last century the larva was collected from *Myrica* and willow.

No account has been given of the early larval instars for whenever eggs have been obtained the resulting larvae have died when young. Mr. J. Newton reared 17 larvae from the egg but they all died by early April probably because of substitute food. These he says were never truly quiescent, they nibbled occasionally at common dock. They were one-half to three-quarters of an inch long at mid-January. Larvae have been found at Borth in early May while still very small, others half-grown at the same date. Sadler found larvae from a quarter grown to three-quarters grown on 27th April 1968 (*Ent. Gaz.*, 20:64). The peak time for the larger larva at Borth appears to be late May and early June, but Odd found a fully grown one as late as 27th July. G. Warnecke (1926, *Ent. Zeit.*, 40:173–189), *Agrotis subrosea* Steph. on the Continent, its forms, distribution and biology, has given the most thorough account. He discussed colour variation at length and listed the distribution which ran from Siberia to Sweden, Germany and France. He illustrated the egg and listed the following foodplants: *Andromeda polifolia* L., *Vaccinium uliginosus* L., *Ledum palustre* L. (Marsh Rosemary), *Myrica gale* L., *Populus tremula* L. (in captivity) and *Calluna*. He wrote 'the larvae hatch in autumn and overwinter whilst small. They appear (as other noctuid larvae) to feed during the winter whenever conditions are favourable so



Figs. 1-4 *Coenophila subrosea* Steph.
Figs. 5-9 *Trisateles emortualis* Schiff.

that development within the species is not uniform'. He gave these times of appearance of larger larvae: end of May on *Ledum*, *Vaccinium* and *Andromeda*; 11th June, Hambourg; 21st–22nd June, Pommern. Warnecke discussed the probable causes of distribution and linked this with occurrence of foodplants after the Ice Ages and said that apart from the former occurrence in the English fens the species was found on peat bogs. He thought that *subrosea* was expanding its range westwards and he listed in order the years and localities in which the moth was first discovered from the Baltic and Prussia 1886–90 to Lüneburg 1923. He concluded that *subrosea*, as other scarce species, had occasional periods of plenty. The Borth colony would seem to indicate that this species has always had wide but very localised distribution and that no expansion has necessarily taken place.

De Worms (1968, *Ent. Gaz.*, 19:83) has given a summary of the literature and reviewed the history of *subrosea* in Britain. His reference to Schultz should be corrected to *Ent. Rec.*, 37 (not 39).

Description of last instar of larva. An extremely handsome larva that measures 38 mm long at full growth. It has a cylindrical body with pronounced taper from the small head and constricted pro- and mesothorax, the third thoracic ring is swollen and the rest of the body is plump and firm, the segmental divisions weak so that the body has a smooth and even profile. There is sharp taper from the ninth abdominal ring and the remaining rings are very small. The prolegs are small and borne on weakly developed cushions. The skin is very smooth and soft bearing only sparse, tiny, pale, short hairs.

The body colour is pinkish inclined to rosy or purple tinged with yellow; along the dorsum it is mottled with fine black irrorations that become intensified towards the subdorsal stripes and there form a pair of conspicuous deep black dashes on each abdominal ring, and a dark band along the thorax. Between the subdorsal stripe and the subspiracular band the skin is coloured first rust and then dark pinkish purple caused by the pink ground colour being heavily speckled in black. The bold mediodorsal stripe is clear primrose, broader at the beginning of each ring, constricted at the centre and broad again at the posterior edge; the stripe is edged in black, and runs unbroken from the head across the prothoracic plate to the anal plate. Subdorsals also bold primrose, slightly broader than the mediodorsal, the edges a little ragged and dramatically edged above by the black dashes, margined below in deep orange. The subspiracular band is extremely broad on the abdomen, is clear cream with a darker sinuous shadow at its centre; it begins on the prothorax as a narrow stripe but swells quickly on the third thoracic ring; it is continued down the sides of the anal claspers; on its lower side the band is edged in the dramatically contrasting colour of deep, dark brown. Spiracles small, black, oval, set at the centre of each ring in the upper edge of the subspiracular band. On the ventral surface the body is a warm flesh tint with the prolegs suffused rose-pink.

Head pale grey-brown, smooth with soft short hairs, flattened in front, the mouthparts also pale with a reddish brown ring around the ocelli. There are two widely spaced vertical brown stripes in front, broadest above and tapering to a streak each side of the clypeus. True legs grey-brown and small. Prolegs flesh pink and rosy. Anal claspers tiny, flesh pink. Prothoracic plate grey-brown, weakly sclerotised, crossed by strongly developed primrose dorsal and subdorsal stripes, fine black freckling at the sides, anal plate similar.

The ground colour may be very pale and the black subdorsal markings greatly reduced, while in other examples the ground colour is darkened and the subdorsal

dashes joined to form a continuous black stripe and the purplish lateral band is also intensified.

This larva is undoubtedly correctly classified in that group of genera that link *Amathes* to *Triphaena* for it possesses the shape, small head, swollen thorax, markings pattern and broad lateral band that are common to them all, indeed it is only the well-pectinated antennae of the male moth that has argued separation from *Amathes*. The larva is not at all unlike *A. depuncta* L. or *Cerastis rubricosa* Schiff.; superficially it could pass for *Lygephila pastinum* Treits., but hardly *Ceramica pisi* L. as has been suggested.

Figures—Plate IV, figs. 1–4. All last instar, one soon after the last moult. Borth, north Wales, on *Myrica gale* L. from Bernard Skinner, 17.v.68 and from A. J. Wightman, 8.vi.69.

Trisateles emortualis Schiff. Olive Crescent

There are numerous instances amongst the British Lepidoptera of species becoming plentiful for a few years and then disappearing for a long while, and even for so long that a generation or two of collectors may pass before the insect is found again. There are several explanations of this, not least significant being the changing fashions of collectors and their collecting grounds. The species *T. emortualis* is rather more unusual than most in that far from being formerly common only three specimens had ever been seen in Britain, these all in the short period 1858–9 and in the Chilterns district; and nothing was ever known of the life history. To these must be added the instance of a previously unrecorded moth in 1910 at Stonor, also in this same area (Greenwood, 1967, *Ent. Rec.*, **79**:116). Since its rediscovery in 1962, however, the moth has been seen in some quantity in the Chilterns, especially since 1967 when considerable numbers have been taken at mercury vapour light and in 1969 a specimen was caught near Haywards Heath in Sussex (1970, *Ent. Rec.*, **82**:30). Also in 1967 the larva was reared from the egg and finally larvae and pupae were both found wild in 1967 and 1968. The high degree of research and sophisticated collecting techniques that are forcibly applied by the collector of today can account for the relative ease with which discoveries are now made, and the strength of local insect populations revealed, but it still comes as a surprise that such a moth could remain undetected for so long in a part of the country that is very accessible and where there is a relatively high resident population of collectors.

An account of breeding this species and of the discovery of wild larvae and pupae is given by B. R. Baker (1969, *Proc. Brit. ent. nat. Hist. Soc.*, **2(1)**:5–8) with illustrations of larvae and comparison of the pupal cremaster with that of *Zanclognatha nemoralis* F.; the characteristic feeding habits of the larva are well illustrated and show the peculiar skeletonising effect of leaving the veins uneaten. Baker was able to confirm that dead oak leaves were eaten rather than beech, as indeed other writers on the continent had found; Baker's experience in rearing the larva from the egg suggests the principal food to be oak leaves that have fallen in the current year rather than older leaves of previous years.

I am especially pleased to record my gratitude to Mr. Baker for his generous supply of larvae, also to applaud the success of his brilliant field work.

Comparison with other British deltid larva. In Britain *T. emortualis* is unique in being the only brown larva of this group of moths that has but two pairs of functional prolegs. Other larvae that have similar colour and markings are *Zanclognatha tarsipennalis* Treit., and *Herminia barbalis* Clerck, but both of these

have four pairs of prolegs and both species are only half-grown in September and then hibernate. The larva of *H. barbalis* is otherwise very similar to *emortalis* and it also feeds on decaying oak leaves after hibernation, but during the autumn it is obtainable by beating green foliage. The larva of *Paracolax derivalis* Hübn. is still rather small by the autumn, is black and has four pairs of prolegs. The larva of *Z. nemoralis* F. pupates in the autumn, as does *emortalis*, but it has a distinct dark dorsal stripe and four pairs of prolegs.

A general note on brown deltoid larvae. Those deltoid larvae that are brown are adapted to living and hiding amongst dead and decaying foliage and especially among the litter of fallen deciduous leaves under high forest. They are sluggish and not well equipped for climbing as indeed they have little need. The cuticle of the body and head is soft and velvety, being covered in a dense pile of very short fine hair that does not shine or reflect light. The body segments are soft and flattened beneath, and this feature, together with a well-developed lateral flange, enables the larva to flatten itself closely to the smooth surface of a dead leaf and so escape detection. Movement is habitually slow and sluggish but larvae can become very active when subjected to bright light.

Description of last instar larva. Measures to 18 mm long at full growth. The shape of the body is cylindrical, much flattened on the ventral surface, it is broadest until fully grown at the second and third thoracic rings and rather constricted at the first abdominal division, but at full growth the fifth and sixth abdominal rings are quite as broad as the thorax. All rings are broader than long and there is very little taper until the last two. There is a well-developed lateral flange on the thorax and first three abdominal rings.

The ground colour is mostly some shade of sienna, shaded in flesh-pink, orange or ginger and dusted darker brown. The intersegmental folds of the abdomen are soft orange. The overall appearance of the larva is warm and fulvous. The only ornamentation that is apparent to the naked eye is a series of dusky, or quite black, blotches placed in pairs on the dorsum at the intersegmental folds between all abdominal rings, and these are darkest on the first four rings. These blotches are roughly squared but teased forward as a little streak that reaches onto the next ring; the intersegmental fold between the marks is clear orange. In the heaviest marked example there is a further dark blotch at the centre of each abdominal ring dorsum and a weak cross figure can be seen that links the central blotch to the pair on each side of it. The eighth abdominal ring is paler than the rest and on each side of its dark dorsal central mark there is a tawny orange patch. On the sides of all abdominal rings there is a dusky streak extending obliquely downwards from the dorsal intersegmental blotch and these streaks are best developed on the first six rings; in some specimens all the streaks are very weak.

Under a modest lens a delicate white mottling can be traced. There is a very fine, weak mediodorsal stripe beginning on the posterior half of the first thoracic ring that continues right onto the anal ring; the central dorsal blotch can be seen as a darkened streak within this stripe; the stripe is finely edged in milky brown and bordered again outside in dark brown. There is a rudimentary subdorsal stripe composed of a similar series of lines and this also runs the full length of the body. Ventrally the larva is shaded blue-grey with pink skin folds. The skin of the dorsum is studded with strong black warts that each carries a solitary fine black bristle. The spiracles are small, black and oval, no larger than the adjoining warts except the pairs on the eight abdominal and thoracic rings where they are larger and placed much higher up the side of their ring.

Head globular, large, broadest at the bottom, the epicranial suture marked by a fine pale line, pinky-brown to dark olive in colour, smooth but not shining, carrying fine hairs in front, mouthparts of the same colour, lobes of the head mottled with a fine reticulation. True legs and prolegs pinky-grey, there being only two functional pairs and these are borne on rings five and six of the abdomen, there is a very tiny and rudimentary pair on ring four. The cuticle is covered in a velvety pubescence and it is not differentiated into prothoracic and anal plates, the only ornamentation these rings display are black warts. The front edge of the prothorax can appear as a pale rim.

Before it becomes fully grown the larva has a striped appearance due to better defined dorsal and subdorsal stripes; the colour is then a more uniform darker brown and the orange penultimate body ring is more swollen than any other. Amongst five larvae sent to me by Mr. Baker, which he had especially selected from many to show the range of variation, one was a pale greenish yellow and its sole markings were tiny black warts and pairs of weak dorsal blotches. The other larvae were some shade of warm brown, two had well-developed dark dorsal blotches and lateral stripes, the others had these features but poorly expressed. One larva had a series of delicate crosses along the dorsum.

The illustration in Hofmann (1893, *Die Raupen der Schmetterlinge Europas*, Pl. 38, fig. 14) is not well coloured and depicts a larva that has coarse bristles.

Figures—Plate IV, fig. 5–9, all last instar, on dead oak leaves, collected in Bucks., by B. R. Baker. Figures 12.ix.68.

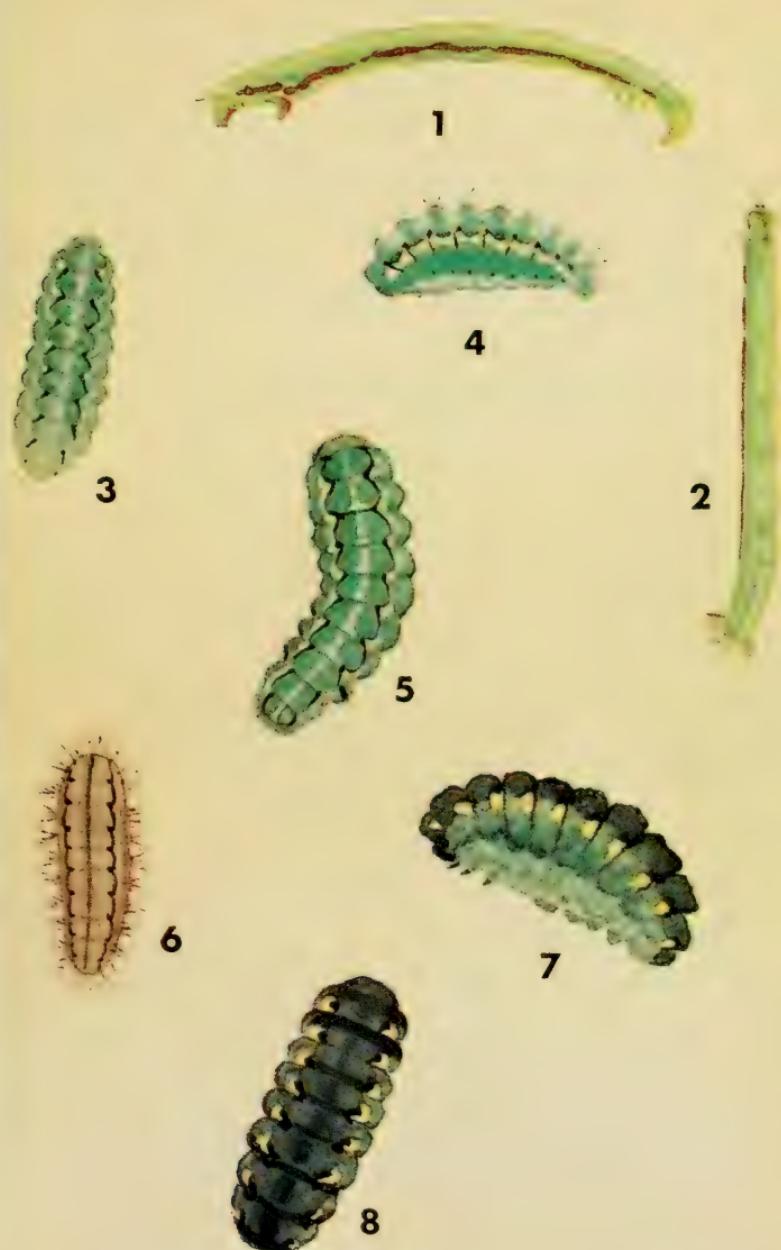
Dysstroma truncata Schiff. s.sp. *concinnata* Stephens Arran Carpet

Dr. E. A. Cockayne had a very special interest in this insect and published detailed accounts of both the moth and the larva. In *Proc. S. Lond. ent. nat. Hist. Soc.*, 1931-2:16, he dealt with the early stages and compared the larva with *D. truncata* Hufn.; his note in *Amat. Ent.*, 5(38):26 (1941) is a summary of his earlier work, while in *Ent. Rec.*, 65:273 (1953) he explored the differences between Scottish and Irish specimens in the Rothschild-Cockayne-Kettlewell collection and his principal findings are here quoted.

To sum up my conclusions I think *concinnata* Stephens is a subspecies of *truncata* and not a distinct species and consider that it inhabits the high ground of Arran, the neighbouring mainland, and South Uist in the Outer Hebrides. I do not think the Lewis specimens are worth separating though they are less uniform in size and in the appearance of the hindwing. *Oressigena* Wild is a synonym of *concinnata* Stephens. In Orkney there is a peculiar race which deserves a sub-specific name. Specimens from the Highlands of Scotland and the mountains of southern Ireland are on the whole very similar and are brighter and more boldly marked than most English ones, but cannot always be distinguished from them. In our Irish series there is a higher percentage of blackish specimens. The use of the name *concinnata* for either race is incorrect and neither has been named.

This summary rejected the view that Irish specimens from Achill Island belonged to *concinnata*. Because of the doubt that has always surrounded the identity of *concinnata*, reports of this insect from western Scottish islands, the Scottish mainland and from Ireland cannot with certainty be referred to this or *truncata* (or even *citrata* L. in some cases). Huggins (1960, *Proc. S. Lond. ent. nat. Hist. Soc.*, 1959:182) confirms that Kerry moths are *truncata* and says that when Baynes bred the Kerry insect under normal conditions it became double brooded.

D. S. Fletcher (1953, *Ent. Gaz.*, 4:227) gives useful references, and in the 1961 edition of South (*Moths Brit. Isles*) he briefly reviews the moth's status. The



Figs. 1-2 *Dysstroma truncata* Schiff. s.sp. *concinnata* Steph.

Figs. 3-5 *Zygaena viciae* Denis & Schf. s.sp. *argyllensis* Tremewan

Figs. 6-8 *Zygaena loti* Denis & Schf. s.sp. *scotica* Rowland-Brown

genitalia are described and figured by Pierce (1914, *Gen. Brit. Geometridae*), also by Tams (1941, *Amat. Ent.*, 5(38):13). C. N. Hawkins discussed the pupa in *Proc. S. Lond. ent. nat. Hist. Soc.*, 1931-2:21. Prout in *Seitz Suppl. Pal. Geom.* (1934) quotes Rayward 'there are no differences in the genitalia which can be depended upon as good characters' for the separation of *concinnata* from *truncata* but goes on to say 'the occurrence of the two allies side by side but with different life-cycles and without any intermingling, is sufficient evidence for Arran of biologically distinct species'.

According to Cockayne the larva of *concinnata* hibernates as a small larva and eats heather in the wild state, but thrives on strawberry leaves in captivity. It is a single brooded insect.

Buckler's figures c and d, Vol. 8, plate 143 of *truncata* show a form similar to *concinnata* except that the shade of green is much too pale. Almost any brood of *truncata* may produce a small proportion of red marked individuals of varying red intensity and extent.

I am much indebted to Mr. Austin Richardson who loaned me larvae for figuring, these had been forced to maturity during December on leaves of garden strawberry.

Description of last instar larva. Cockayne's original description made from 12 specimens is as follows.

'The full-grown larva is slender and tapers towards the anterior end varying in length between 22 mm and 25 mm. The dorsal surface has a ground colour of cerro green (Ridgway) with a continuous narrow central line of much darker green starting on the third thoracic somite. In one larva this dark central line is bordered on either side by an incomplete whitish green line, most distinct near the ends of the somites. According to Buckler the larva of *citrata* has the dark central line bordered with white, but not that of *truncata*. On either side of the ground colour of the dorsal region there is a distinct subdorsal stripe. This is pure white on the three thoracic somites; on the first thoracic it is sharply curved with the convexity inwards; on the second the subdorsal stripes are a little further apart and on the third still further apart, and on both these somites they are slightly curved with the concavity inwards. On the abdominal somites the subdorsal stripes are well defined, but tinged with yellow on the more anterior ones and with pale green on the more posterior. There is a broad continuous lateral stripe of Hay's maroon (Ridgway), or of a colour a little lighter or darker, starting in three larvae on the first and in the rest on the second or third thoracic somite. This stripe becomes broader in the middle of each somite where it may even touch the subdorsal stripe, and narrower at the inter-segmental areas, where the concavity formed below is filled in with very pale green. In most the lateral is separated from the subdorsal stripe by green colour. The ventral surface is green of a slightly paler tint than the dorsal, with a narrow central yellow line and with a thin greenish white line on each side of the anterior part of each somite ending at a point just posterior to the first pair of tubercles. Each intersegmental fold appears as a narrow yellow transverse line. In one larva heavily marked with maroon the four ventral tubercles of each somite are ringed with maroon, and there is a short line of the same colour in the middle of the venter between the first pair of tubercles, running forward to a point slightly anterior to them; in another larva still more heavily marked there are in addition extensions of maroon from the lateral stripes to all the rings around the ventral tubercles, excepting those on the first and second abdominal somites. In these two larvae two broad maroon bands run transversely between the first pair of prolegs and

two narrower ones cross the venter between the first and anal pair. In one larva the lateral stripe is narrower and redder than in the rest, absent on the first and second thoracic, and reduced to a few specks of colour on the anterior part of the sixth and seventh abdominal somites where there is a thin white line above and a greenish white stripe below. On the eighth it is represented by a large, and on the ninth by a small, red spot. In most of the larvae the prothoracic plate has maroon markings; the first two pairs of legs in the majority are green and the third pair maroon; in two the maroon of the lateral stripe does not extend onto the base of the third pair but in the rest it does so, and in two of the most heavily marked all three pairs of legs and their bases are maroon. The whole of the first pair and the anterior half of the anal pair of prolegs are maroon even in the most lightly marked, and in the most heavily marked the whole of the anal pair is of this colour. The processes on the anal pair of prolegs are white or pale green dorsally and in every case deep pink laterally on both inner and outer aspects. The anal flap is divided almost equally into a central portion of cerro green and two very pale green lateral portions, the central being slightly the wider. The tubercles are white contrasting strongly with the maroon stripe and green ground colour and the setae appear to be dark red; the spiracles are white. The head including the mouthparts varies from cerro to a blackish green and has maroon markings.

Figures—Plate V, figures 1–2 last instar ex female, Isle of Arran, from Austin Richardson. Reared on cultivated strawberry leaves, figured 12.xii.59.

Zygaena loti Denis & Schiff. s.sp. *scotica* Rowland-Brown
Slender Scotch Burnet

The 1961 edition of South (*Moths Brit. Isles*, Ser. II, p. 330) contains the first accurate account of this burnet given in a British work under its correct name of *loti*. The name *loti* was first introduced into British literature as a result of the researches of W. G. Tremewan (1958 and 1960, *Ent. Gaz.*, 9:189 and 11:185), until then the moth had been called *achilleae* Esper. The full history of the species in Britain has since been given by Tremewan (1968, *Ent. Gaz.*, 19:203) wherein are chronicled the excursions and specimens collected since the discovery here of the species in 1907. It seems that very few attempts had been made, for while the moths had been found to be quite numerous when finally located, it had always proved to be exceedingly local and for many years there had been confusion, even controversy, as to its precise identity. The synonymy of the Scottish subspecies is discussed by Tremewan (*loc. cit.* 208).

Discovered first at Morvern on the Scottish mainland, today the only authenticated localities are on the islands of Mull and neighbouring Ulva. Records from other western Scottish islands require confirmation.

The larva has been hatched from the eggs of captured females on several occasions, de Worms 1961, Grosvenor 1929 and 1931, Cockayne 1940, and Edelsten 1946, but most of these larvae died during the winter and those that were still alive in the spring then died before feeding. Like some other zygaenid larvae of northern and alpine habitats this species is known to pass more than one winter in the larval stage; the commonly accepted explanation of this is that varying length of larval life ensures that different individuals of the same parents may emerge in different years and so maintain randomness of gene distribution in a very localised colony insect of specialised habitat. Few accurate observations are recorded of the behaviour of these larvae during hibernation; Tremewan is one of the few observers to witness the pattern of the hibernating zygaenid larva, and he has found that a moult is made just prior to diapause and again soon after

activity is recommenced, with no more than a minimum of feeding taking place before the spring moult. In those species that pass more than one winter as a larva he has found that the second diapause is begun immediately after the spring feed and moult so that the larva hibernates for the second time in one instar later than that of the previous winter. The sole instance of a larva having been found wild is Bretherton's record for Morvern in 1961. When reared in captivity the larva has eaten *Lotus corniculatus* L. and Tremewan records (*loc. cit.*, 215) that the moth is found where this plant grows with *Erica* and *Calluna*. The cocoon was first described accurately by Edelsten from a specimen reared in captivity in 1946, it was not found wild until 1967 when Tremewan confirmed on the Island of Mull that the cocoon was spun on the ground.

In October 1967 Tremewan gave me two larvae of *loti* which he was rearing from eggs laid by a female moth caught by him in Mull that summer. These two larvae passed the winter in a cool place indoors and remained, in their brown skins, right through the following summer; during the winter of 1968 the larvae were kept in a container surrounded by damp cotton-wool and placed within a plastic box. Early in spring 1969 one died and the other was given into the care of my mother who found that when over-wintering this species, and also *Z. viciae* Denis & Schiff., it was helpful to maintain moisture all winter so that the hibernating larva did not dessicate, and to aid the larva to moult when it resumed activity. The most convenient way of achieving this is to place the larva in a tin and keep this in an airtight container that is packed with damp cotton-wool. My mother found when rearing these two species that they liked to rest on damp moss and that they would spend much time closely examining the moss with the mandibles and apparently sucking moisture. Both species remained inactive for long spells and both fed up avidly during the last instar. This larva of *loti* became active during the latter half of April and moulted on 8th May, apparently without having eaten or passed frass since coming out of hibernation; it passed the last moult on 23rd May. It disliked bright light.

In both the first (1909) and 1939 editions of South (series II, plate 1, fig. 5) there is an illustration of a larva called *Z. achilleae* copied from Hofmann 1893 *Die Raupen der Schmetterlinge Europas* (plate 9, fig. 21), but this is quite unlike any instar of *loti*, and instead looks more like an unnatural representation of *viciae*. The description that accompanies this figure (Hofman, p. 36) is certainly inapplicable to *loti* and the foodplants are decidedly unlikely for this species. Meyrick (1927, *Revised Handbook*) also gives a description that appears based on this same figure and is equally incorrect for *loti*.

I am grateful to Mr. Tremewan for supplying me with larvae of this species and for much information on both of the zygaenids described in this work.

Description of the hibernating larva. During hibernation the larva assumes the colour of pale fawn or ochre tinged with pinkish or purplish brown throughout. The dense forked bristles are strong and black. There is a blurred but conspicuous dorsal stripe of dulled maroon and a pair of scalloped subdorsal bands that consist of a prominent black dot at the anterior margin of one ring linked to a purplish black prominence at the posterior edge of the preceding ring.

In the next instar as the larva comes out of hibernation the colour is still purplish brown and the dorsal and subdorsal stripes remain similar in form and colour to those of the previous instar, but instead of being uniformly pinky brown on the sides of the body the larva now develops a yellow patch below each of the dorsal prominences. The prominences themselves and also the paired black spots are much enlarged.

Description of the last instar larva. Length, when stretched, 20 mm. The body thickset and fleshy with very little taper at either end, the rings extremely narrow and about four times as high as broad when the larva is contracted, the inter-segmental divisions very pronounced and the dorsal surface steeply arched between.

The dorsum is a lustrous, velvety blue-grey with deep green suffusion, and this shades at the sides to a soft rich emerald, and paler still below the row of spiracles. There is no subdorsal line, instead a row of bold luminous yellow patches where the dorsal grey meets the lateral green, each patch being rather flattened at the posterior edge where it adjoins the next ring. There are ten pairs of these patches that occur on each ring from the second thoracic. Each patch has immediately above it and adjacent to it a sharply defined jet-black spot, and close to this but situated on the very anterior edge of the following ring is a larger oval spot also deep black. A pair of such black spots is present also on the prothorax where there is no yellow patch. There is a broad ill-defined dark purplish mediodorsal stripe.

Head very small and retractile, when the larva is contracted what appears to be a dark head is in fact the prothorax. The head is uniformly black but has its palpi and labrum soft and grey. True legs yellowish green tipped with black, prolegs and anal claspers pale yellowish green. Spiracles black, oval, centred in white, each spiracle situated at the lower edge of a fleshy green cushion of the quilted skin. The body hairs are so fair as to appear white, and are branched in the usual zygaenid pattern.

In Britain the larva of *loti* can be confused in appearance only with those of *purpurealis* Brünn., or *exulans* Hohe. *Z. purpurealis* has a pale dorsal line that is lacking in *loti*, its black lateral spots are smaller and single, whereas the larger spots of *loti* are paired with one on each of two adjoining rings. This same difference in spotting may also hold good between *loti* and *exulans*, which look very similar in colour and pattern, but our only reliable source of description of the latter is from Buckler's Swiss larvae and his description is not detailed enough. The problem of identification of the wild larva is eased by the limited occurrence of *exulans* which has never been found in western Scotland or the Isles, or indeed anywhere away from its Braemar home.

Figures—Plate V, figures 7–8, last instar in its second year, figured 2.vi.69; figure 6, hibernating larva, 10.ii.69, reared on *Lotus corniculatus* L. Loch Tuath, Isle of Mull, ex female taken by W. G. Tremewan.

Zygaena viciae Denis & Schiff. s.sp. *argyllensis* Tremewan
New Forest Burnet

The burnet moth that formerly occupied a restricted part of the New Forest in Hampshire was the subspecies *anglica* Reiss, and was commonly called *meliloti* Esper, but this insect is now lost from Britain and instead the Scottish population is described as a separate subspecies *argyllensis* Tremewan (1967, *Ent. Gaz.*, 18:159). Discovery of the Argyllshire colony dates only from 1963 when F. C. Best first found it (1963, *Ent. Gaz.*, 14:149) and so far few people know its location. The Argyll insect is described by Tremewan in its habitat together with an account of finding the wild cocoon. Earlier Tremewan (1966, *Ent. Gaz.*, 17:187) had given a very full history of *Z. viciae anglica* in the New Forest with an exhaustive list of literary references.

During the years when s.sp. *anglica* was found in the New Forest a great deal of collecting notes were recorded in numerous journals. The insect was bred from

the egg on a number of occasions; the early stages were well-known and the larva adequately described, but there appears to be only one instance of the larva being found wild and this is Tremewan's record (1966, *Ent. Gaz.*, 17:197) of Lyle who took a dozen fully fed larvae on 28.v.11 and who accurately described the cocoon and its location. Tutt 1899, *Brit. Lep.*, 1:465), gave a very detailed description of the larva and its structure, also a mention (from a continental source) that the larva of *viciae* was to be found in numbers in the shade but only singly in sunshine. The larva is well described also by Barrett (1900, *Lep. Brit. Isles*, 2:124), but the illustration on plate 59, fig. 1c, is very poor. It would be remarkable had Buckler left no figure of this species for the moth was plentiful in the New Forest during his time and he lived not far away at Emsworth. Tremewan recalls (1966, *Ent. Gaz.*, 17:188) that Briggs sent a larva to Buckler and it may be his illustration that was copied for Barrett's work although no figure was ever given in Buckler's own posthumous volumes. The figure given by Wilson (1880, *Larvae Brit. Lep.*, Pl. 10, fig. 4) is grotesquely unlike this species or any other. Stokoe (1958, *Caterpillars Brit. Moths*, p. 144) describes the larva and illustrates the eggs. A similar description (and probably the origin of the last) was printed in the 1909 and subsequent editions of South (*Moths Brit. Isles*), and in the 1909 and 1939 editions was given an illustration (series 2, plate 1, fig. 5) after Hofmann of the larva called *achilleae*, but which is instead much more like an unnatural figure of *Z. viciae*.

Tremewan (1965, *Ent. Gaz.*, 16:119) has described the egg and habit of laying, and several writers have commented on the larval habit of over-wintering twice. Tremewan tells me that it is rare for any zygaenid larva to hibernate more than twice and in his experience larvae that do not feed up after their second winter will soon die. However *Z. exulans* has gone on record as hibernating up to four times.

I am indebted to Mr. F. C. Best for sending me a quantity of eggs laid on 9th July 1968 by a female taken in cop. in the west Argyll colony discovered by him in 1963. The eggs hatched on 21st July and although the young larvae began to feed well enough they were soon reduced in numbers by a parasitic fungus. By the autumn there were only four survivors and at the following spring only one larva had begun to feed. This time of life is especially tricky for larvae in captivity and once again I am pleased to record my gratitude to my mother who nursed this particular larva through to full growth as she has done with so many other difficult species. This larva was kept in a glass-topped tin containing wood-wool and tissue paper and enclosed within a polythene box packed with damp cotton-wool. The box was placed in an unheated room all winter and brought into a sunny, gently warmed room during March. The first activity was noted on 16th March and feeding began three days later. Moults were passed on 7th, 14th and 26th April, and the larva was fully grown by 4th May.

The larva spent long periods motionless both during the moult and between moults, but it could for short spells be very active; during the last two instars it was an avid feeder on small stems as well as leaflets. It was only ever offered *Lotus corniculatus* L. Tremewan described (1965, *Ent. Gaz.*, 16:123) how young larvae ate *Lotus*, *Lathyrus pratensis* L., *Trifolium pratense* L., *T. repens* L., they accepted *Vicia cracca* L. but not readily.

Description of last (seventh) instar larva. Measures to 22 mm long when contracted, rather longer with the head and thorax extended. In shape very thickset with squat rings that are much taller than broad and rather squared, and rapid taper at the prothorax and on the last two abdominal rings which are especially

squared anteriorly. Apart from the sharp taper at each end the body is of uniform width both dorsally and laterally.

The general colour is a rich luscious emerald green tinged with blue and yellow, the dorsal and lateral bands being pale cobalt. The pattern is simple, the central dorsum of each ring comprising a broad rhomboid figure, the shape of those on the prothorax being more rounded, each figure is constricted at the anterior margin of its ring and its edges are but slightly curved outwards to end squarely at the posterior margin, the edges are finely etched in black and comprise the finely-drawn tail of a conspicuous black dot set on the anterior edge of the ring. These dots are bolder on the fifth abdominal ring and start on the mesothorax. Immediately below this spot there is a large semi-circular patch of brilliant chrome yellow placed vertically against the posterior edge of the preceding ring, and the patches are linked to one another by a pale blue band. There is a broad dorsal stripe of dulled cobalt that has no sharp edges but which merges into the adjoining darker green, and at the posterior margin of all rings except the last two the pale colour is extended to form a narrow transverse streak. The last two rings are more ochreous as also is the prothorax.

There is no hard prothoracic or anal plate but the fleshy anal flap is bilobed. The head is very small, black, shining and retractile, the bases of the palps and mouthparts are blanched. The skin is soft and fleshy except at the intersegmental divisions, and it is freckled with tiny black dots that are not visible to the naked eye; the skin is deeply quilted and has large fleshy lateral cushions. The true legs are greyish with strips of black chitin on the outer surface. Prolegs pale yellow-green, the crochets black. Spiracles tiny, oval, black, the centre pale, placed low down beneath the lateral cushion, and centrally on the ring. There are short, pale, fine, spiny hairs set and grouped in the typical zygaenid pattern. Ventrally the larva is plain dark green.

The general appearance is of a soft, velvety caterpillar with a pale indistinct dorsal stripe and a series of broad squared dorsal figures set off by pairs of jet-black dots and luminous yellow lateral patches.

Figures—Plate V, figure 3, penultimate instar, 20.iv.69; figures 4–5, last instar, 4.v.69. Reared ex ova from female, West Argyll, F. C. Best. On *Lotus corniculatus* L.

PROCEEDINGS

9th APRIL 1970

The President, Dr. B. J. MACNULTY, in the Chair

The following new member was declared elected: Mr. P. W. Cribb.

EXHIBITS

The PRESIDENT—(1) *Melanargia galatea* L. (Lep., Satyridae) from Pendrey, Carm., 8.vii.68. The colony here was first noted in 1943, but although looked for in 1944 and in 1945 was not found. It was again discovered in 1968 about two miles from the original spot. As the original find in 1943 was in a drive in a young pine wood these may have been strays from the true colony found in 1968. This is the most westerly colony known to the exhibitor, who knew only two other localities in Wales, one near Bridgend and another close to Caerwent. (2) *Panaxia dominula* L. (Lep., Arctiidae) from Otterbourne, Hants., 29.vi.69.

These Hampshire examples seem rather black on the forewings compared with some examples he had from Kent.

Mr. A. E. GARDNER—The following Coleoptera. (1) A pair of *Xantholinus semirufus* Reitt. (Staphylinidae) taken on the sandhills at Braunton Burrows, N. Devon, 28.iii.70. (2) A series of *Ptinus fur* (L.) (Ptinidae) taken with *Enicmus minutus* L. (Lathridiidae) in a recently vacated honey-bee hive at Kentisbury, N. Devon, 29.iii.70. Although *P. fur* is quite catholic in habitat sites and has been recorded from wasps nests, it does not seem to have occurred in bee-hives before.

Mr. A. S. F. RIPPON—A book *The Sources of Invention*, which he donated to the library, in which were several references to instances of important medical discoveries arising out of genetic work in entomology.

Mr. E. S. BRADFORD—Hibernating larvae of *Coleophora anatipennella* Hübn. (Lep., Coleophoridae) from Chestfield, Kent, on twigs of *Prunus spinosa* L.; also containers in which they have been kept out of doors under natural conditions.

COMMUNICATIONS

The PRESIDENT announced the titles of three books presented to the library by Mr. S. N. A. Jacobs.

Mr. C. F. RIVERS read a paper on 'Insect Virus Diseases and Pest Control' which he illustrated by coloured transparencies and a cinematograph film. The talk was followed by a lengthy discussion.

23rd APRIL 1970

The President, DR. B. J. MACNULTY, in the Chair

SPECIAL MEETING

From the Chair, the President moved the following resolution:
 'That authority be given to the Trustees of the Society to administer the Erich M. Hering Memorial Research Fund as set out in the regulations governing the fund, such details having been circulated to all members.'

The motion being put, was carried without dissent.

- The President then proposed the following regulations governing the fund:
1. The Fund shall consist of (a) the sum of £1,800 given to the Society by Frau Hering on 27th December 1969 and (b) such further sums as may be allocated or transferred to it, whether from the income of the Fund or otherwise.
 2. The capital of the Fund shall be invested in the names of the Society's Trustees, and its capital and income shall be administered within the general Trusts of the Society.
 3. All expenses relating to the capital of the Fund shall be payable, at the discretion of the Society, either out of the capital or the income of the Fund.
 4. The income only shall be used for the promotion of entomological research with particular emphasis on:
 - (a) Leaf-miners.
 - (b) Diptera, particularly Tryptidae and Agromyzidae.
 - (c) Lepidoptera, particularly micro-lepidoptera.
 - (d) General entomology.

- in the above order of preference, having regard to the suitability of the candidates and of the subjects proposed.
5. The Council of the Society shall appoint a Management Committee of not less than four members. This will normally consist of the President and Treasurer *ex officio* and others to be appointed annually.
 6. The Management Committee shall be responsible for giving due publicity to the Fund, for managing its income, and for making awards from it, subject to Frau Hering's wish that awards shall not be restricted to residents of the United Kingdom. They will make a report to the Society's Annual Meeting and to the Council at other times as necessary.
 7. These Regulations, having been adopted by a Special Meeting of the Council under Bye-law 26, shall not be altered, nor shall additional regulations be made, except by a similar Special Meeting.

The motion was carried without dissent.

23rd APRIL 1970

The President, Dr. B. J. MACNULTY, in the Chair

The following new members were declared elected: Mr. I. M. White, Mr. B. L. D'Abra and Mrs. L. M. D'Abra.

EXHIBITS

The PRESIDENT—*Pediacus depressus* (Herbst) (Col. Cucujidae) from Suffolk. Pupae were obtained under the bark of old cut oak trunks, 27.v.69. The bark was so old it could be peeled off easily with the hands in long strips. The imagines emerged during June 1969. He also showed *P. dermestoides* (F.) from Epping Forest, 14.x.61, for comparison.

Mr. A. E. GARDNER—The following Coleoptera taken in the New Forest, Hants, 11–12.iv.70: *Carabus arvensis* Herbst ssp. *anglicus* Mots. (Carabidae), from a sandy heath; a series of *Pterostichus aterrimus* (Herbst) (Carabidae) from a sphagnum bog; *Philonthus atratus* (Grav.) (Staphylinidae) from a sphagnum bog; and a pair of living *Meloe proscarabaeus* L. (Meloidae) taken by Mr. D. Appleton on St. Katherine's Point, I.o.W., 18.iv.70.

Col. A. M. EMMET—Larvae and mines of *Acrolepia perlepidella* Staint. (Lep., Plutellidae) on *Inula conyzoides* DC., taken at Wrotham, Kent, 23.iv.70.

COMMUNICATIONS

Mr. A. E. GARDNER suggested that Dr. MacNulty should take another look at his *Pediacus depressus* Herbst, using the latest key as he suspected they might be *D. dermestoides*.

Mr. L. W. GEE gave a talk on 'The River Dart' which he illustrated with coloured transparencies.

The Society's Publications

Back numbers of the Society's Publications still in print are becoming scarce. We regret therefore that we have had to reassess their value and new prices have been agreed. These are as follows:—

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Other secondhand copies when available according to condition.

* These copies are very scarce and contain papers in great demand. Member's discount cannot therefore be allowed.

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MEETINGS OF THE SOCIETY

are held regularly at the Society's Rooms, but the well-known ANNUAL EXHIBITION takes place this year on November 1st in the Conversazione Room at the British Museum (Natural History). Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings. The current Programme Card can be had on application to the Secretary.

8521

NOVEMBER 1970

Vol. 3 Part 4

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Fig. 1. *Rhadinopasa hornimani* Druce



Fig. 2. *Nephele aequivalens* Wlk. Pale form

OUTLINE LIFE HISTORIES OF SOME WEST AFRICAN LEPIDOPTERA

Part III Sphingidae

By B. J. MACNULTY

INTRODUCTION

This is the third paper in the series and for general introductory remarks and notes on terminology the reader is referred to Part I.¹ The order of genera follows that of Seitz² as in Parts I and II.³ However, the publication of Carcasson's recent list⁴ has necessitated considerable revision and all the name alterations have been made. Nevertheless the Seitz order has been preserved as far as possible since this work is more available in libraries than Carcasson.

The Sphingidae because of their large size, their strong flying power and wide distribution are perhaps the best and most completely known family of Lepidoptera. Thus many of the larvae have been found and the imagines bred out. Despite this and despite the occurrence of numerous blown specimens in museums, descriptions of larvae are in general remarkably rare in the literature and many of these are only given as additions to descriptions of imagines and are at best very superficial.

Pinhey in his valuable book⁵ quotes many previously unpublished larval descriptions, which I understand he obtained direct from the naturalists mentioned. I admit that I have drawn freely on this work to supplement and fill in gaps in my own notes and the availability of this work has contributed greatly to my own.

I have also used Sevastopulo's descriptions as quoted by Carcasson; these are generally the best in existence with a wealth of detail not found elsewhere; detail which often contains the invariant characters in otherwise very variable larvae.

Finally I have been able to examine larvae in the national collection at the British Museum (Nat. Hist.), after the descriptions in this paper had been written. In most cases the descriptions have agreed well with the preserved specimens.

It is pertinent, since I have freely quoted published descriptions of larvae which I have not myself seen, to remind readers that in my own descriptions the head is treated as segment 1, whereas many authors treat the head separately and number from the segment posterior to the head. Their segment 1 is then my segment 2. In quoting I have not altered the author's wording, so care must be taken over comparing segments.

LIFE HISTORIES

Herse convolvuli L.

A very difficult larva to describe accurately, as not only does it have a green and brown form but these, particularly the latter, vary considerably. Readily available descriptions^{6, 7} are hardly sufficient to lead to unequivocal identification. Good descriptions which have been given^{8, 9} whilst enabling the larva to be distinguished from other British or European specimens do not pinpoint, or may not even mention, those characters which enable it to be distinguished from other tropical species.

Light form. Green with black spiracles. There are black subdorsal lines running from segments 2 to 11 where they end in the base of the caudal horn. On each of segments 5 to 11 there are lateral dark brown stripes lined on the ventral side in white which run posteriorly upwards into the subdorsal lines. Gibbs reports that the lateral stripes may be yellow, and that the ground colour may also be yellow.

Dark form. This form is basically a deep purple brown which superficially looks black. All the markings that in the green form are black are very pale pink or cream in the dark form.

In both forms the head varies from creamy to toffee brown in basic colour. The sutural line is a thin black one. On each side of the face there is a broad black vertical band, and a similar lateral band. The caudal horn, at any rate in the last instars, is black or reddish brown and may or may not be tipped with white; it is posteriorly concave and the apical third lies in a plane parallel to the dorsum. Occasionally there is a faint median dorsal line from segments 5 to 11. Gibbs reports this line may be white or yellow. There is every variety of form as to the amount of black on the larva and a complete gradation of forms between the light and the dark. Many have been described.^{10,13} However, the subdorsal lines and lateral stripes can always be detected although they may rarely be reduced to rows of dots. Likewise the bars on the face and the shape of the caudal horn in the last instars appear invariant.

In Nigeria the species fed on *Ipomoea cairica*, *Newboldia laevis* and on one occasion was found on *Dissotis rotundiflora*.

Acherontia atropos L.

This species is also very well known; the description is therefore restricted to such points as are necessary for identification or are used in the key. The descriptions have been checked against those of previous workers.^{6,7,9,11,14,15}

Light form. The larva usually has a ground colour of some shade of green varying to yellowish, particularly in the final instar; in early instars the ground colours may be blue. There is a diffuse median dorsal line of the same colour as the lateral stripes, on segments 5 to 11; this is well marked in the young larva but may become evanescent in the final instar. On each of segments 5 to 11 lateral stripes run posteriorly upward from the anterior edge of the segment at a level just below the spiracles and run into the dorsal medial line close to the posterior edge of the segment. These stripes are bright yellow below and vary above from light electric blue to deep brown-purple. The spiracles are black. The caudal horn is short, stout, yellow, and granular. The larva is heavily spotted above the lateral stripes with violet spots. The head varies in colour with the body and has a broad black band round the sides; a thin black line runs down each side of the face. The legs on segments 2 to 4 are black with large white spots.

Dark form. The larva is very variable. The head is dirty yellow with dark markings as in the light form. Segments 2 to 4 may be pinkish white dorsally with deep chocolate sides or the colour pattern may be reversed. There is a single or double median dorsal line, there may or may not be subdorsal broken black lines on segments 5 to 11. The prolegs on segments 7 to 10 are often black and there may be a bright orange line near the pad. The lateral stripes on segments 5 to 11 are black, brown, or very dirty lavender. The colour below these stripes is usually pale whitish pink. The caudal horn is pinkish white and in the young larva is concave posteriorly in the basal half, apically concave anteriorly. As the larva approaches maturity this apical anterior curve becomes shorter and is almost completely lost.

It has many food plants;⁵ in West Africa it has been found on *Solanum torvum*, *Clerodendron splendens* and *Clerodendron paniculatum*¹⁶ and on one occasion on *Lantana camara*. The pupal stage in Nigeria lasts from two to three weeks to as long as ten weeks. Although this larva was found more commonly than any other Sphingidae never in four years did I succeed in attracting the adult to the mercury vapour lamp. It was the only hawk moth that I failed to trap in this manner.

Coelonia mauritii Butler (*fulvinotata* Butler)

The larva, which is very inadequately described in Pinhey⁵ and Seitz,² is extremely variable.

Light form. The head of the larva is pale green; the suture appears as a very fine dark line. There is a black line down each side of the face. Down the side of the head there is a yellow band and behind this a black one. The legs are black with numerous yellow dots. Anteriorly on segments 3 and 4 there are small paradorsal projections and three or four much smaller ones behind these. Segment 2 bears only the smaller projections. On segments 5 to 12 there is a broad brown or reddish dorsal band which usually continues through segments 2 to 4 but may be absent from these. Posteriorly on each segment a band arises from the dorsal band and runs diagonally down the side ending at the anterior edge at about the level of the spiracles; this line divides anteriorly and is usually edged with yellow. At the junction of the dorsal and lateral panels on segment 12 the long caudal horn, which is apically and dorsally concave, arises; it is of the same colour as the dorsal band. The spiracles are black. In the fully mature larva the green may be almost entirely replaced by bright saffron yellow. This may have a camouflage effect amongst the flowers of the numerous food plants. Examples in which the dorsal band and the lateral stripes are green have been noted.

Dark form. The dark form is exceedingly variable but is basically black or brown dorsally, and laterally above the lateral stripes, and white or pinkish cream ventrally and below the lateral stripes; but white may replace the brown and vice versa to an almost unlimited extent. However the dorsal brown band can usually be detected at least as a pair of dark lines, and the lateral stripes are dark brown sometimes tinged with purple. Almost invariably the area above the prolegs and below the lateral stripes is white or cream so that each of segments 5 to 12 appears to bear a white lateral triangular mark. Segments 2 to 4 which bear projections in the light form are sometimes in extreme forms nearly all white dorsally with deep chocolate sides and sometimes the reverse. The legs are black with pale yellow dots. The prolegs are usually deep black and may have an orange line just above the foot. The head is creamy or pale leather brown in colour and the caudal horn white with a black tip.

The larva has a wide range of food plants.⁵ In West Africa I have found it on *Lantana camara*, *Clerodendron splendens*, *C. paniculatum*, *Newboldia imperialis*, *Solanum torvum* and *Lycopersicum esculentum* whilst Seitz records it in South Africa on *Dahlia* and probably other Heliantheae.

Pupation takes place in a loose cocoon woven three to four inches below the ground and the imago emerges in between three and four weeks.

Xanthopan morgani Walker

I have not taken this larva myself but Carcasson⁴ reports as follows: 'body clothed in fuzz of white setae. Head and body blue green. A series of seven white Vs with apices on dorsum pointing backwards. Spiracles black surrounded by a white ring. Horn stout, black, armed with pale lilac spines slightly down curved. Legs deep pink, ringed basally with black. Prolegs green with a black band. Claspers broadly edged with black. Anal flap vermillion, black tipped.' Food plants are given as *Anona senegalensis* and *Ibaria* sp (*Anonaceae*).

Blown larvae in the British Museum do not have a fuzz of white setae (the setae may well have been lost in preservation), but the larvae are very similar to *C. mauritii* but differ in that the paradorsal lines on segments 2 to 4 are covered with sharp little thorn-like spines.

Rhadinopasa hornimani Druce

A green larva with the head and anal segment (segment 13) having the appearance of fine pale coloured leather (Fig. 1). The spiracles are purple and there is no caudal horn. There is a mediodorsal, two pairs of paradorsal, lateral pairs of supraspiracular and lateral pairs of subspiracular rows of very short lavender spikes. All these rows have a small irregular zigzag. The food plant is *Spondeas monbin*. It is reputed to feed on *Millettia aboensis* but I have not found it on this although it will nibble the leaves.

The pupation takes place in an earthen cocoon six to eight inches below the ground. The imago emerges in between three and four weeks.

There does not seem to be a dark form of this larva.

Libyoclanis oweni Carcasson

The head is in the form of an isosceles triangle with an apex of about 30°. There is a bright green line round the edge of the head which is otherwise coloured similarly to the dorsum. The sides of the head are covered with numerous small white spots.

Laterally the larva is olive green growing lighter towards the dorsum which is pale yellow or white above the paradorsal line. The paradorsal lines which vary in colour from purple to rust red arise at the apex of the head and diverge rapidly on segments 2 to 4, they then run to the posterior of segment 11 where they are more supraspiracular lateral than paradorsal. Here they meet a line which runs from the very short caudal horn across segment 11 to the ventral area immediately below the spiracle on segment 10; this line, coloured as the paradorsal one, is etched in white ventrally. On segment 12 the red or purple colour is strong becoming evanescent anteriorly on segment 11 and on segment 10 whereas the white is evanescent on segment 12 and prominent on segments 11 and 10. The caudal horn is also purple or reddish. The spiracles are pale yellow.

There does not appear to be a dark form of the larva.

The larva feeds on *Macrolobium macrophyllum* resting on the stem of the food plant close to the underside of the leaves against which it is almost invisible.

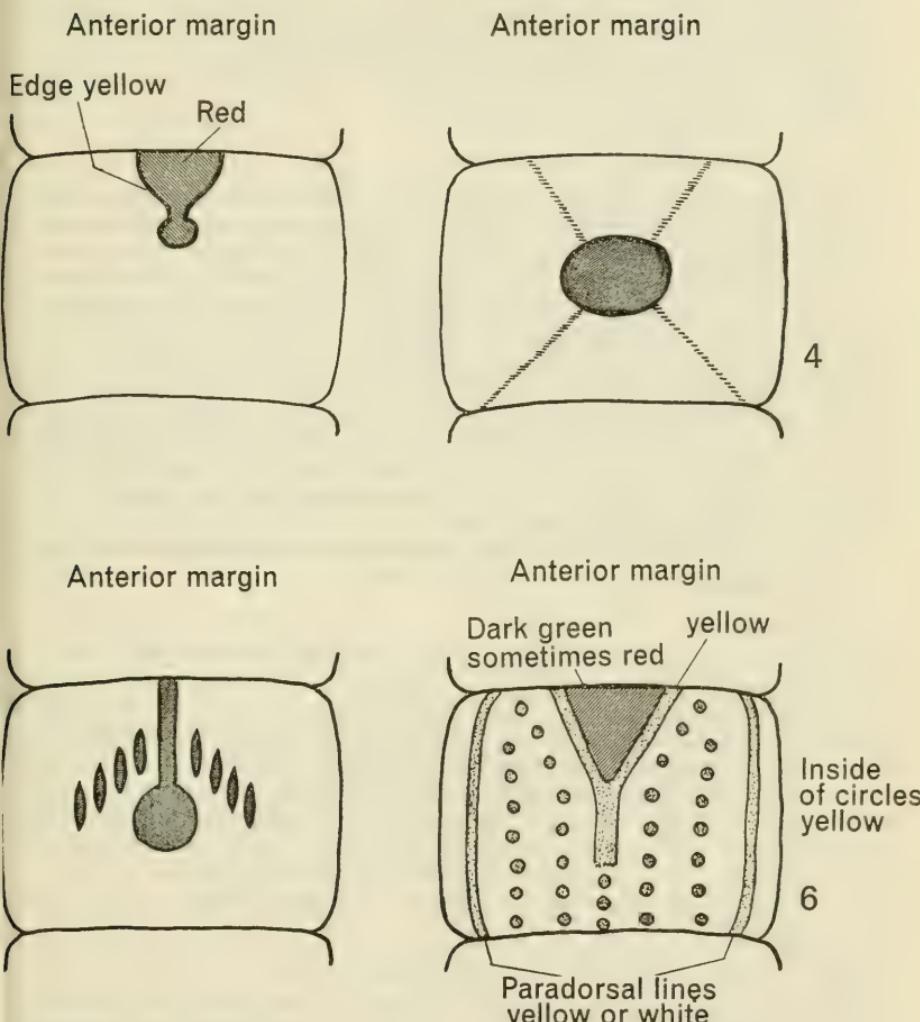
The larva makes a very loose cocoon in the earth or in the debris at the foot of the food plant. The adult moth appears in about eight weeks.

Libyoclanis bicolor R. & J.

I have a specimen of this moth from Gold Coast which was collected by Mr. M. Leech. The larva does not appear to have been described.

Pseudoclanis postica Walker

The granular larva is green with a green triangular head which has a well-marked white line down each side. The dorsum is a whitish green with a mediodorsal line which is edged each side with a white line. There are pale paradorsal lines. The lateral stripes, of which there appear to be only six, are white and very faint. Commencing at segment 5 these stripes run posteriorly and dorsally from the lowest point on the side below the spiracle, above the spiracle on the next segment joining the paradorsal line at the posterior edge of this segment. The stripe arising from segment 10 goes right through into the base of the caudal horn. On segment 11 between the lateral stripe and the paradorsal line is a red streak. The caudal horn, which is straight, is deep navy blue with pale blue spots. The spiracles are bright blue. The anal flap and anal claspers are dark green and

Fig. 3. Basic dorsal marking on *Tennora livida* Holl.Fig. 4. Basic dorsal marking on *Tennora funebris* Holl.Fig. 6. Basic dorsal marking on *Tennora sardanus* Wlk.Fig. 7. Basic dorsal marking on *Tennora reutlingeri* Holl.

are covered with large blue tubercles. The larva ate *Alchornea cordifolia*, but I suspect the true food plant to be a species of *Psychotria*; Pinhey quotes *Morus*, *Ficus*, *Chaetacme spp.*, *Chlorophora spp.*, *Loranthus*, *Trema* and *Celtis* species.

Seitz² gives a very similar description except the white markings are described as yellow and the tubercles on segment 13 are not mentioned. Pinhey gives a similar description to Seitz and also mentions the tubercles on segment 13; he quotes also larvae bred by Poncelet which were slightly different in ground colour and showed minor colour differences.

The pupal stage lasts three to four weeks.

Platysphinx strigalis Walker

This is green larva with bluish sides. There is a faint brown mediodorsal line outlined in yellowish green. From the apex of the triangular head to the posterior of segment 4 are two prominent paradorsal white lines. The lateral stripes are white, and run through parts of three segments. The first runs from just above the ventral surface at the anterior margin of segment 4 and diagonally across segment 4 and 5 ending paradorsally just inside the anterior margin of segment 6. The stripe running ventrally on segment 4 and that on segment 10 are much more clearly marked than the remainder and are dorsally edged with purple. Other stripes run parallel arising on segments 5 to 10 respectively. The last stripe runs into the base of the caudal horn which is yellow with a black base and is sharply ventrally concave. The anal flap is covered with small greyish black dots. The leaves of *Alchornea cordifolia* or *Macrolobium macrophyllum* are eaten but the larva is known to have other food plants.

Pupation takes place in an earthen cocoon below ground and the imago may emerge at any time between four and eight weeks later.

Platysphinx stigmatica phyllis R. & J.

Pinhey refers to a description by Capener, Rodney Wood, Poncelet and a specimen in Transvaal Museum.

A collective description would be as follows:

Light form. Head triangular or conical, green with yellow stripe continued onto thorax. Body is pale green with a dark green median dorsal stripe; there are seven yellow or white lateral oblique stripes partly edged with white or magenta. At base of yellow caudal horn a black-edged, black-dotted patch. On some specimens alternate lateral stripes are often missing, the number being reduced to three, across segments 3 to 5, 6 to 8 and 9 to 11 reaching base of horn.

The larva feeds on *Ostryoderris stuhlmanni*, *Millettia*, *Mundulea*, and *Pterocarpus angolensis*.

Rufoclanis rosea Druce (*Polyptychus roseus* Druce)

The larva is pale green covered all over with very small white (or sometimes pale yellow) tubercles. The blue triangular head has a blue point into which the paradorsal lines run and there is a white line down each side of the face. There are white or very pale lemon yellow paradorsal lines. Each of segments 4 to 11, if examined closely can be seen to be divided into nine separate rings each bearing a ring of raised tubercles which form the general colour pattern on the larva. The tubercles forming the paradorsal lines are enlarged laterally on rings 7 to 9 of each segment and the colour spreads a variable distance around them; on the dorsal side the tubercles are edged in black. On each segment (4 to 11) there is a white patch posteriorly on the paradorsal lines and in the centre of this patch there may or may not be a pink dot. Occasionally the white patch and black

edging are missing so that the pink dot alone remains. The seven lateral stripes are white but evanescent and may be completely absent except for the one on segments 11 and 12 which is usually well marked. There is a very faint mediodorsal green line and an equally faint green dorsal V mark on each segment. The caudal horn is bright blue, black tipped and covered with minute tubercles.

The food plant is *Urena lobata*. Pupation takes place in a loosely woven cocoon an inch or two below the ground or sometimes in vegetable debris below the food plant. The imago emerges after eight or nine weeks but has been known to appear after as little as ten days.

Adriasa contraria (*Polyptychus contrarius* Walker, *retusus* R. & J.)

The larva in many respects is similar to the previous one. It is dark green covered with bright yellow very small tubercles. The paradorsal lines are yellow well-marked on segments 2 to 4 but evanescent on the remainder. The side stripes are yellow the front starting low down on segment 3 and ending mediodorsally at the posterior of segment 6. The second stripe arises on segment 4 and ends on segment 6. The remaining stripes run parallel to the second, the last running into the caudal horn. The horn is bright yellow, strongly concave ventrally, with a large velvet black patch near the base. There is a yellow mediodorsal line. The triangular head has a very high conical point which is raised well above the level of the dorsum. The spiracles are usually yellow, but may be orange. Pinhey says that Barnes reports the larva as green with lateral mauve stripes.

The larvae feed on *Newboldia imperialis*, and on *Markhamia napoleoni*.

The pupal habit is similar to that of the previous species and the imago usually appears between seven and nine weeks after pupation but may emerge much earlier.

Neopolyptychus pygargus R. & J.

I have not seen this larva but Poncelet quoted by Pinhey described it as follows: The head is large, pale blue and the body mainly green, beautifully marked with pinkish violet dorsolateral patches except that the one on the first thoracic segment directly behind the head was pale bluish. There are seven pairs of patches in all each finely speckled with white. Laterally and directly below each violet patch is a large white spot. There is a violet lateral line which reaches the caudal horn which is also violet and straight. On terminal segments running down from the horn is a white stripe.

The food plant is quoted as *Julbernardia globiflora*.

Neopolyptychus serrator Jordan (*Polyptychus serrator* Jordan)

I have again not seen this larva. Carcasson⁴ quotes Sevastopulo: 'The head triangular, green, speckled with white. A bright green dorsal stripe with raised white spots broadening from a point behind head to the 10th somite then tapering to base of horn. A double white dorsal line. Green dorsal stripe edged laterally with white. Lateral areas below dorsal stripe pale lilac then blue-green. A series of oblique whitish lines from 4th to 11th somites. Legs pinkish. Venter and prolegs blue-green, a median white neutral line. Horn slightly down curved, blue-green with a few minute ventral tubercles.' The food plant is given as *Maesopsis eminii* Eng. (Rhamnaceae).

Neopolyptychus compar R. & J. (*Polyptychus compar* R. & J.)

Another larva not seen; the species does not seem to have been reported from West Africa. The description is Dukes quoted by Pinhey. 'Head, triangular dull

blue but tinged with green in lower half. Body: apple-green dorsally, the dorsal area bordered on either side with a narrow pale yellow stripe. On each segmental joint these stripes are broken by pure white irregularly shaped patches each patch with a pale red semicircular spot above, the tiny moles in these pale red spots being tipped with dark red. The number of white patches vary, some larvae having four or five on each side, others less and some only one patch midway along the body, but in all cases the middle patch is the largest. On the sides the colour is darker green with five very indistinct oblique yellow stripes. From the base of the horn a wide pure white stripe runs obliquely down each side, the upper edges of these stripes being finely bordered with dark red. Horn medium length, slightly curved in purple red. The spiracles are narrowly ringed red. The skin is rough in texture and covered with minute hardly discernible whitish moles.

The food plant is given as *Brachystegia spiciformis* and the pupal period about 20 days.

Polyptychoides grayi Walker (*Polyptychus grayi* Walker)

Pinhey⁵ quotes Rothschild & Jordan, and Poncelet, and Townsend. The bluish green head is triangular and in the young larva has a sinuous projection on top. The body varies in colour from apple to bluish green and is covered with small tubercles mostly black or yellow but those on the legs and part of the last segment pink. There are two tubercular dorsolateral lines extending from behind the head to the horn. Between each segment there is a pink triangle on the dorsolateral line (this may be absent in some cases). Legs are black. The horn is yellow or orange or greenish with orange tubercles; it is short and down-curved. There are nine oblique lateral stripes. From base of horn are two yellowish lines edged anteriorly with grey running obliquely down.

The larva feeds on *Cordia* and *Celtis* species.

Falcatula falcata R. & J. (*Polyptychus falcata* R. & J.)

Once again I have not seen this larva and I quote from Pinhey's⁵ report of Poncelet's description. The head is triangular, deep green with an inverted V-shaped yellow mark down the front. The body is granular and yellowish green in colour. A yellow dorsolateral stripe runs from head to horn and there is a faintly marked green mid dorsal line. There are paired dorsal bluish spots on each segment (Poncelet says these are red in very young larvae), ten pairs, the last extended as blue lines edged with yellow, which reach the horn. Horn yellow with more than the basal half above ornamented with dark blue tubercles. There are six faint lateral yellow stripes on the body.

The food plant is quoted as *Erythrina abyssinica* and *Sclerocaraya caffra*.

Pseudoandriana mutatus Walker (*Polyptychus mutatus* Walker)

This species has not been reported from West Africa. Pinhey⁵ quotes Duke. Body granular dull greyish blue in colour (but may be reddish) finely speckled with white. Horn long slender, black. The head is edged in reddish brown. Head, body and horn are covered with fine pimples. The larva feeds on *Baphia* species.

Acanthosphinx gussfeldti Dewitz

Of a sage green colour the skin of the larva is divided into a series of small irregular quadrilaterals by a fine network of thin black lines. The spiracles are deep red. There is a spiracular row of long sharp horn-like yellow setae, one anteriorly on each segment, those on segments 2 to 4 being smaller than the rest, and also a subspiracular line of much smaller setae, two or three to each segment.

Each segment is divided into nine rings. On each of segments 5 to 10 there is a long broad-based yellow horn-like seta placed supraspiracularly on ring 6 of each segment and one on each succeeding ring and also on rings 1 and 3 of the posterior segment (there being no such seta on ring 2). These setae run diagonally from the supraspiracular seta on ring 6 of one segment to the seta placed paradorsally on ring 1 of the next posterior segment forming a large irregular triangular yellow patch. The setae posteriorly on segment 10 and anteriorly on segment 11 form a paradorsal row. There are similarly formed patches on segments 3 and 4, and also on segment 2 where most of the setae are missing or very small. On segments 12 and 13 similar setae occur but do not form regular patches. Setae on segments 2 to 10 are yellow, those on segments 11 to 13 are bright red. The caudal horn which has several thorns or branched setae arising from it is bright red and scarcely longer than the other setae; it is only slightly curved. The anal flap and claspers are a deep reddish brown. The head is rounded and a pale brown colour. The food plant is called by the local inhabitants Awoliwa. The larva pupates in the soil and my specimen emerged after two and a half to three weeks.

Lophostethus demolini Angas

The very large larva is pale yellow green paling dorsally almost to white, though some specimens are also green on the dorsum. The head is a bright orange colour without markings. Segments 3 to 11 with six rows of steel blue barbed spines each of a length equal to about half the body thickness; the base of these spines is white. Two rows are paradorsal and four, two to each side, are lateral. The upper ones of the lateral rows continue on to segment 12 and the lower two on to segment 13. The spines of the paradorsal and upper lateral rows arise in the middle of the segment, but those of the lower lateral row towards the front of each segment. There is also a paraventral row of shorter barbed spines each side situated centrally on each of segments 2 to 13. The legs are black with two orange stripes, one at the tip. The prolegs are steel blue at base with two very short spines and there is another spine centrally on the green portion of the leg. The anal flaps are steel blue with two spines at the top one behind the other, the posterior one about half the length of the other. The spiracles are white. The caudal horn is also metallic blue up to twice the length of the spine, down-curved, pointed and heavily barbed. Segment two has a steel blue ring anteriorly with six very small conical spines corresponding to the rows of spines on the other segments. Behind this ring in the paradorsal position are two almost invisible spines. Pinhey says head is green with black stripes and that there is a creamy yellow patch below the lateral spines. The larvae I had appeared only to eat in daylight. Food plant was a species of *Ficus* but *Milletia aboensis* was eaten in captivity. Seitz mentions *Hibiscus tiliaceus* as a food. Pinhey gives *H. panduriformis*, *Dombeya spp.*, *Corissa spp.*, *Andersonia*, *Crewia occidentalis* and a number of the Sterculiaceae.

The pupa is formed in a tough cocoon four or five inches in the earth. The imago emerges about three weeks later.

Cephonodes hylas L. ssp. *virescens* Wallgr.

Pinhey⁵ states that the larva is very variable, that the Indian race is green and white and the African one is black and yellow. Larvae taken by myself were green, white, black and yellow and would seem to be an intermediate form.

West African larvae: Larva 1. Early instars have a dark green back with paler green sides. Paradorsal lines are white with one large lateral black dot below this on each of segments 3 to 12. The caudal horn is long and black. Anteriorly *

segment 2 is raised and yellow. In the final instar the ground colour is pale apple green with a pale grey-blue dorsal line. Paradorsal lines are white and the black lateral dots are almost joined into a broad lateral band. Spiracles are pink ringed in a broad white patch which is surrounded by a red-brown ring. The caudal horn is black sharply curved downwards towards tip, with base yellow; anal claspers yellow horny with raised tubercles; tubercles occur also on the anal flap. Segment 2 is yellow with yellow tubercles. This corresponds roughly with Duke's description of the Indian form.

Larva 2. Is very pale green with a dark black dorsal line and broad white paradorsal ones, below which are black lateral bands. The spiracles are white with a surrounding white patch bordered by a pink circle, and the whole encompassed by a yellow-ochre patch. Posteriorly there is a black vertical lateral line on each segment. There is also a sublateral broken black line on each side. Legs are black and the prolegs blue-green with a yellow band. The horn is black and the anal flap yellow. Segment 2 is horny and yellow with small raised pimples.

Larva 3. As Larva 2 but with a white dorsum and paradorsal broken green lines consisting of widely spaced short thin vertical stripes. Caudal horn black with a yellow base. On segment 12 anterior to the horn a black line runs from dorsal line to the lateral black line.

There is considerable variation from larva to larva from nearly all black to nearly all white and green. The yellow segment 2 with raised pimples and yellow claspers seem to be nearly invariant.

West African larvae were found exclusively on *Oxyanthus brevi-floris* but Pinhey gives *Burchellia*, *Gardenia*, *Kraussia*, *Poreta* and *Vauqueria* species. The time spent in the pupa can vary considerably, being as little as five days or as long as 42; the average seems to be 10 to 16 days.

Deilephila nerii L.

The general colour of the larva is green. There is a large lateral eye spot on segment 3; this is often surrounded by a black ring with a white ring outside it. The centre of the eye is deep blue when larva is kept in poor light but turns to pale pink when larva is in bright light. There is a lateral white line which starts between segments 4 and 6 and runs to segment 12. There is also a very thin laterodorsal line which runs into the yellow waxy-looking horn. There is a white vertical lateral line anteriorly on each of segments 6 to 9 (sometimes also on segment 5) with several white spots just posterior to it. Just below the dorsolateral line is a row of three to six white spots. This description agrees with that of Pinhey.⁵

There is also a rare dark form in which the whole larva is a deep golden orange covered with a variable amount of black, both dorsally and laterally. There is a thin dorsal black line from segments 2 to 12. The white markings on the side are more extensive than in the light form, many of the spots being replaced by thin vertical lines. The spiracles are nearly always surrounded with a ring of orange.

The caudal horn in the full-grown larva of both forms is short, thick, slightly rugose and bent through a right angle.

Stokoe⁷ illustrates a form intermediate between the two described above.

Has many food plants.¹² In West Africa was usually found on *Gardenia*, and *Oleander*. In West Africa the pupal stage occupies about ten days.

Nephele comma Hopffer form *derasa* R. & J.

The West African form is *derasa* R. & J.

There are two forms of the larva: green and dark brown. Both are almost indistinguishable from *Nephele accentifera* Beauv.

Light form. Pale or dark green covered with very small white spots. Head green with a broad yellow stripe down each side and a pale cream thin inverted V on face. A yellow or white lateral line runs from segment 5 or 6 (sometimes from segment 3) widening posteriorly, into the base of the caudal horn. The caudal horn is slightly concave anteriorly and has a dark bluish dorsal spot just before the apex. In the young larva the yellow lateral stripe is often very faint or missing. On the anal claspers there is a dark green equilateral triangle. The legs are white. There is a pale creamy lateral triangular patch similar to that described for the dark form, bounded by the paradorsal line on segments 11 and 12, but sometimes restricted to 12.

Dark form. The general colour is dark chocolate-brown. Segment 2 is reddish brown, the head greenish brown, the yellow stripes quite distinguishable. The legs are white. There is an indistinct dark dorsal band of varying width. Segments 1 to 6 are heavily spotted with small white dots. A lateral dark line runs from segment 6 to the posterior of segment 10. In some cases this line is faintly pink. From the end of this line on segment 10 as apex, there is a pale triangle bounded by two lines, one pale pink running into the dorsum at the caudal horn, and the other posteriorly downward to the ventral aspect of segment 13. From the apex of the triangle down to a line running from the base of the caudal horn perpendicular to the other side of the triangle the colour is pinkish white. The remainder of the posterior of the larva is a dirty green with numerous yellow spots. The caudal horn is blunt, slightly concave posteriorly, with pink sides, and a whitish tip.

R. Wood (in Pinhey⁵) agrees with this description except for the lighter posterior triangle; he says the spiracles are white but all my specimens had dark spiracles.

Poncelet (in Pinhey⁵) considers that the brown form is the larva of *comma* whereas the green form produces *derasa*. Both my forms produced *derasa*.

Poncelet reared his larva on *Diplorhyncus cardylocarpus*. It is also reported to eat *Carissa*. The West African larvae fed on *Macrolobium macrophyllum*. The pupal stage lasts about 15 days.

Nephele oenopion continentis R. & J.

In general the colour is brown or red-brown. The head is dark chocolate and very small. The dorsum is red-brown with scanty dark mottling. Laterally the larva is deep chocolate and there are dark paradorsal lines which are just distinguishable against the lateral coloration. There is a faint trace of a triangular pale lateral patch on segments 11 and 12 but it may not always be distinguishable. The caudal horn is strongly curved downwards and black in colour. When alarmed or at rest, segments 2 to 4 are retracted into segments 5 and 6 which swell out into the shape of a hood so that the larva takes on the appearance of a small cobra.

The food plant is referred to by the Ibo as Awoliwa but I have not yet succeeded in identifying it.

The larva pupates in earth or in the debris at the foot of the food plants. The imago emerges after about two and a half weeks.

Nephele accentifera Beauv.

Although the moth is not uncommon in West Africa the larva was not found. Pinhey⁵ reports the following descriptions adding that the larva is said to be stout with front segments rather enlarged.

'According to Duke it can be dark brown or dull green. In the dark form the sides are paler and there is a diffuse oblique lateral pale orange stripe from leg of

segment 2 along the body becoming nearly dorsal further back. Last two segments pale orange at sides and below, this area edged above with a black stripe; showing above as a black V with its point resting on the base of the horn. Horn black and thick. Head oval, brown with paler stripes. In the green form of larva the pattern is similar.

'Poncelet showed the author [Pinhey] illustrations of three different forms of larva. In each form the thoracic segments of the larva were grossly expanded into a flattened hood-like structure and since the larva poses with the front part of its body raised upwards, head stretched forward to the limit, the obvious appearance is that of a small cobra! In the brown form of larva the hood is triangular and only extends from the second and third thoracic segments. Body deep brown with an oblique yellowish subdorsal stripe on the fore part of the abdomen and a pale triangular patch on the terminal segments. Horn stout brown almost straight with a small dorsal spine or tooth at the tip. In another form of larva the head and body are pale bluish green: the stripe at the front of the abdominal segments and the edges of the posterior triangle are whitish. In this form the "hood" is rounded and stretches out from all three thoracic segments. Horn much shorter violettish. The third form of larva is more like the brown one but is variegated and more blue-grey than brown: marked with fine dark lines running criss-cross along the sides of the body rather like the veins on some dead leaves. The pale forward stripe on the body is variegated brown and white. Larvae loaned by Transvaal Museum have the front segments narrowed not enlarged; a pale lateral stripe starting on fourth segment travels back dorsally to end in a dark V below the horn; the latter is stout and short; a pale lateral triangle is seen on the last segment.'

Larvae in the British Museum (Nat. Hist.), are similar but the green ones are very faded and much of the fine detail is lost. They do not show any marked difference from the description already given except that in the dark form there are between 6 and 8 fine dark transverse dorsal lines on each of segments 5 to 12, sometimes also on segments 2 to 4. These stripes also appear to occur in the light form but the larvae have been too badly damaged in preservation to be sure. The larva can be distinguished from *Nephele comma* in the final instar by the caudal horn which is short, broad and somewhat blunt with a small dorsal spine at the tip whereas in *comma* the horn is longer, thinner and bluntly pointed. Also the horn in *accentifera* tends to be purple whereas in *comma* it is brown or black. The dorsal stripe in *accentifera* is more marked on all segments whereas in *comma* it can rarely be seen except on segments 2 to 4. Also the dark V mark on the dorsum on segments 11 and 12 with the point on the caudal horn in *accentifera* has the arms at a wider angle, broader and darker than in *comma*. The transverse dorsal lines on the segments of *accentifera* seem to be absent in *comma*.

Nephele rosae Butler

The larva occurs in two forms.

Light form. The head is green with a pale inverted V mark rising from sides of mouth to vertex, with a broad lateral white or more often yellow stripe. Body laterally green, lighter anteriorly, and darker posteriorly. Dorsum white with some green and a thin dorsal green line. A white lateral band arises subventrally and anteriorly on segment 6 and runs diagonally into the dorsum at middle of segment 8 widening considerably so that at the dorsum it spans more than half a segment. There is a suggestion of a similar but much narrower cream band running from segment 5 to segment 7. A lateral white band runs from the anterior of segment 8 to the posterior of segment 10 where it splits in two lines, the upper of which runs laterally into the base of the caudal horn; the lower line runs

diagonally to the anterior subventral edge of the anal clasper. Above the upper line the dorsum is marked with green. Between these two lines the whole of segment 11 is covered with a series of close-set very fine white lines which are continuous over the dorsum. The whole of segments 12 and 13 are more or less white over green. The pale yellow caudal horn is long, thin, erect from a small hump and curved anteriorly over the apical half. The legs are pink. Spiracles small, black.

Dark form. The ground colour varies from a dark chocolate to very reddish brown. The head is chocolate with a dark chocolate band down centre. There is a dark, often broken dorsal line. The lateral diagonals running across segments 5 to 7, 6 to 8, 7 to 9 are white and broken up into many small spots and lines and look very much as if they were white paint smudges. The lateral line arising anteriorly on segment 8 is deep chocolate or black. The apex of the triangle formed by the dividing lines at segment 10, is on segment 11 ivory white and may be faintly pink. A white edge may run into base of caudal horn. On each segment there may be six to eight pale brown dorsal spots. The caudal horn, shaped as the light form, is a deep blue-black. The legs are deep brown. One specimen showed a short, thin, vertical lateral line on segment 2.

Sevastopulo (in Carcasson⁴) describes the larva of *Nephele rosae* ssp *illustris* Jordan as very similar to the light form above, the main differences being a purplish dorsal line wider posteriorly, the stout purplish horn and the legs being blackish set in yellow patches.

The larva spins a very loose cocoon in the debris on the surface of the ground and the pupal stage occupies ten to fifteen days.

Nephele aequivalens Walker

As usual there are both light and dark forms of the larva which is difficult to describe accurately since all the markings are very variable.

Dark form. The general colour of the larva is dirty brown. The head is a pale brown with pinkish bands down the side and a small black triangle outlined in pink in the centre of the face. On each segment there are paradorsal lines ending anteriorly and posteriorly in black spots; these lines vary greatly from larva to larva and even from segment to segment; they may be almost evanescent, reduced to the end spots or the spots may be absent. There is a brown dorsal line well-marked on segments 2 to 4 but often very faint on segments 5 to 11. On each of segments 5 to 11 there is a circular dorsal dark cream circle from which a cream-coloured dash protrudes anteriorly. The edges of this mark may be ill defined on some segments. There are broad diagonal lateral cream bands running downwards anteriorly on each segment; these diagonals start and finish on the posterior and anterior segment respectively. On segments 11 and 12 the paradorsal lines run into the base of the caudal horn which is short, tubercular and a dirty brown mottled with darker marks. On segment 13 just behind the horn there is a velvet black patch. All spiracles are dark black.

Pale form (Fig. 2). The basic colour is pale apple-green, and the head is green marked as the dark form but in pale purple. There is a dorsal line on segments 2 to 12, well marked on 2 to 4 but very faint on the remainder. The paradorsal lines are purple and, except on segments 11 and 12, broken (being reduced to a bar across the segmental joints) on segments 2 to 10; it is almost complete but rather faint on segments 2 to 4. There are two purplish not too well-marked lateral bands and a faint suggestion of purple diagonal bands on segments 5 to 11. The tubercular caudal horn is short, broad and straight, coloured pale yellow with brownish or dark purple mottling.

There is a picture in the British Museum collection of a larva bred on *Funtumia elastica* which is almost identical to fig. 2, except that there appear to be a number of lateral tubercles and pimples on the British Museum photographed specimen.

The food plants are *Macrolobium macrophyllum*, and *Chrysophyllum albidum* but the larva is known to occur on other plants.

The pupal chamber is usually made about four inches underground sometimes more and the pupal stage lasts 17 to 18 days.

Temnora livida Holl.

A pale apple-green larva, with the head and second segment a darker green. The head which is a darker green than the rest of the larva has a white or pale green line running vertically from the apex to half way down the face where it splits into an inverted V ending at each side of the mouth. Down each side of the face is a white or faintly green line which towards the apex runs into the white paradorsal line which runs the whole length of the larva into the base of the caudal horn. On segment 2 the dorsum is a dirty green quite different from the other green on the larva with a dark dorsal transverse line posteriorly which approximately matches the colour of the head. There is a very faint green dorsal line of variable thickness from apex of head to base of caudal horn; on this dorsal line at the anterior of each of segments 5 to 11 there is a small red mark in the shape of a chess pawn with its base anterior to the segment (Fig. 3). There is a faint and ill-defined dorsal diamond pattern, the subsections of which occur at the red pawn marks. Down each of segments 5 to 11 are side stripes running diagonally from the anterior margin at paradorsal line to the posterior one subventrally. The diagonal is formed of a dark green line with a thin pale green one below it. The caudal horn is of medium length thick and curved ventrally through 90°. The legs are reddish, and the spiracles black.

The larva feeds usually on *Psychotria* but has also been found on *Harungana madagascarensis*. The pupal stage lasted only a week.

Temnora funebris Holl.

The general colour is a dark olive-green with a pinkish flush. The dorsum has a dark patch on each segment consisting of a rhomboid with a small pale dot posteriorly; there is also a small dark mark in the centre on the anterior of each segment. A pale pink dorsal line runs from apex of the head to the caudal horn. The head has two pinkish lines down the side which continue straight into the two pink paradorsal lines that run into base of the caudal horn. Segments 2 to 4 are dark olive. Pale lateral stripes on segments 5 to 11 run diagonally from anterior edge of each segment at the paradorsal line to the subventral posterior edge. Faint criss-cross markings on the dorsum in form of a cross on each segment, the centre of the cross being at centre of dark patch (Fig. 4).

The species feeds on *Psychotria*. The larva pupates in debris at foot of food plant and the pupal stage lasts between seven and ten days.

Temnora fumosa Walker

Sebastopulo⁴ describes the larva as follows. 'Head green rounded. Body pale green speckled along the secondary segmental divisions with white. A subdorsal white line edged above with darker green. The ground colour paler below the dorsal area. Legs pale green ringed with black. Prolegs and venter pale green. Horn stout, slightly down curved, greenish blue with minute black tubercles. Spiracles white with the central slit black. Becomes suffused with purple when preparing to pupate.' The larva feeds on *Camellina*.⁵ I have not found the larva

in West Africa, although the moth is not uncommon. It seems probable that a dark form also exists.

Temnora sardanus Walker

Carcasson⁴ reports that the early stages of this moth are unknown. The larva is yellow-green in general colour (Fig. 5). The head is green with a yellow line edged in very dark green at each side of the face. This line runs with a faint break between the head and segment 2 into a yellow paradorsal line, edged dorsally in dark green which runs the whole length of the larva into the base of the caudal horn. On each of segments 3 to 11 there are transverse rows of small yellow tubercles between the segmental folds; dorsally between the paradorsal lines, segment 3 has four or five rows of four or six tubercles, segment 4, three rows of four tubercles followed by three rows of six, segment 5 has seven rows with tubercles varying in number between four and six and the remainder have eight rows containing seven or eight tubercles each. The rows are continued laterally with three or four tubercles per row. There are bright, thin, yellow diagonal stripes on segments 3 to 11 each arising anteriorly at the segment edge below the paradorsal line at one third the distance between it and the subventral surface; the diagonal runs downwards posteriorly through the spiracle, which is dark green, to the posterior edge at the subventral surface. There is a yellow dorsal mark anteriorly on each segment in the shape of an inverted 'Y' on each of segments 4 to 11 with a suggestion of the mark on segment 12. The space in the inverted V of the Y is coloured dark green (Fig. 6). This dorsal mark obscures some of the small yellow tubercles. The dorsum of segment 2 and of segment 12 anterior to the horn are also coloured dark green. The anal flap is edged with a thin yellow line. The caudal horn is yellow, thin pointed and straight; it is covered with small tubercles which are black towards the base.

The larva feeds on *Psychotria* and pupates in the loose vegetable debris on the surface of the ground. The pupal stage lasts about 12 to 15 days.

Temnora reutlingeri Holl.

The general colour is a deep purplish red-brown. Head purple with faint pink lateral lines running into paradorsal lines. The paradorsal lines are pale pink on segment 2, which is darker than the rest and on which the lines are well-marked, and segments 3 and 4 on which the lines are fainter. From the centre of segment 7 to the centre of segment 10 the dorsum is a bright green with paradorsal lines yellow green. In the centre of the dorsum of each of segments 8, 9 and 10 there is a mark which approximates to a stylised flower (Fig. 7) in red surrounded by an edge of yellow. On each of segments 6 to 11 there are faint pink diagonal lateral stripes running from the paradorsal area downwards to meet the posterior of the segment subventrally. The food plant of this species is *Psychotria* and also *Harungana madagascarensis*. The pupal chamber is spun up amongst the debris below the plant and the imago emerges after about two weeks.

Pseudenya benitensis Holl.

When very young shortly after hatching, the larva is green without noticeable markings and has a yellow caudal horn. This larva was found close to the empty eggshell but it was not known how long it had been hatched. Two days later segments 4 and 5 had turned black as had the horn which had a white tip.

Final Instar. The general colour is green, the head green, with purple-brown on the face above the mouth parts. Segment 2 with dorsum white is laterally a deep purple-brown almost black. Segment 3 is dorsally green with two purple-brown

spots and laterally a deep chocolate or purple-brown, otherwise both segments 3 and 4 are the same, chocolate or dark purple-brown sides, the dorsum slightly lighter with paradorsal pale cream lines. The whole of the dorsum is covered with a regular pattern of white, pale pink or cream dots. The legs are purple-pink. The dorsum widens slightly on segment 4 which is coloured similarly to segment 3 anteriorly, the dark markings suggesting a pair of wings, but there are two large white spots touching in the centre and two just above the eye. There is a lateral eye just below the dorsum in the shape of a very brown blotch with a dark blue spot at the centre. This eye can become obscured by the anterior purple area. The second eye coloured as that on segment 4 lies on segment 5 just below the paradorsal line. Laterally the posterior half of the segment is white.

The dorsum on segments 6 to 11 is pale green and there are two paradorsal lines composed of a pale purple band shading through pink into white. Laterally these segments are pale green. On segment 6 just at the anterior edge just below the paradorsal line there is a blue eye edged in black then pink and finally white very close together. On segments 7 to 11 there are very broad purple-blue lateral diagonals running from below paradorsal line one third from anterior edge downwards to posterior edge at sublateral line; through these segments runs a broad purple-brown sublateral line, dark purple above the prolegs otherwise blue. The prolegs are white with purple spots. Segment 12 has a purple-black dorsum from which arises a very broad posteriorly concave deep purple-lilac caudal horn with a white tip. The horn is covered with very small tubercles. Segments 13 and 14 are dorsally green with a deep purple line in centre. The flaps of the anal prolegs are deep purple. The larva feeds on *Psychotria* and remains 10 to 20 days in the pupal stage.

Sphingonaepiopsis nana (Boisduval)

In 1957 in Port Harcourt the larva of this moth was exceedingly common. I had over 200 brought to me and saw many more in the field. It is quite variable and I give descriptions of four of the outstanding forms in the final instar.

Light Forms.

A. The head is blue-green and the general body of the larva yellow-green. There are paradorsal lines of thin yellow with a dark green line adjacent to it dorsally which run from segment 2 into the base of the caudal horn. A sublateral white band with a thin black line above it runs from segment 2 to the anal claspers which are white. Segment 2 has a lateral white spot anteriorly just below the paradorsal line. The spiracles are white ringed with a very fine black line. The legs and prolegs are green. The caudal horn is long (equal to a quarter of the larval length) erect slightly curved upwards at the tip, and coloured black with orange sides at the base.

There are a number of variations which occur severally and in combinations: the paradorsal lines may be white, the lateral spot on segment 2 yellow; the sublateral band is often yellow and the black line above it can be replaced by one of small orange spots.

B. The larva is similar to A with the following differences. There is a thin brown dorsal line from segments 2 to 12 broadening somewhat on segments 11 and 12. Dorsally segments 5 to 11 are divided in half, the anterior is green and the posterior is brown or yellow. The latter half bears two (one each side of dorsal line) dark brown marks in the form of an inverted V or an X (looking forward towards the head). The paradorsal line is broken and yellow with the dorsal green edging replaced by brown.



Fig. 5. *Temmora sardanus* Wlk.

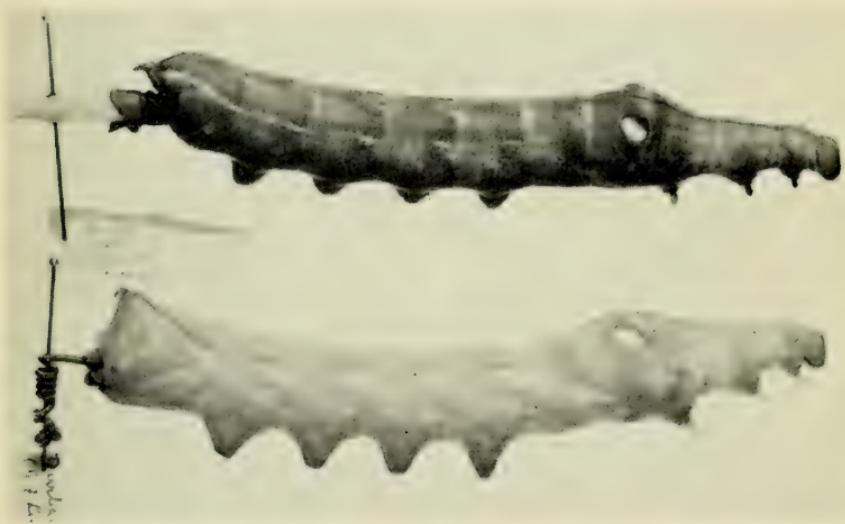


Fig. 8. *Euchloron megaera* L. Blown larvae in British Museum (Nat. Hist.)



Fig. 9. *Centroctena rutherfordi* Druce

Dark Forms

C. This form of the larva is a deep chocolate-brown with a brownish head with paradorsal lines and sublateral bands yellow. The caudal horn as in description A.

D. A striking black larva, with a bright white subdorsal band. The head is grey-green, the legs pink, the caudal horn as previously described and a longitudinal orange stripe on the anal flap.

Sevastopulo (in Carcasson⁴) describes the larva as follows:

'Penultimate instar: head small dull orange-brown. Body blackish brown; a black dorsal line and a subdorsal stripe orange brown on the 2nd somite and on the anterior half of the third somite, thereafter composed of minute white dots. 3rd and 4th somites each with a transverse series of six white dots; the abdominal somites each with two subdorsal white dots the anterior slightly nearer the subdorsal line than the posterior. Legs orange, venter and prolegs blackish brown, feet orange. Anal flap with an orange lateral stripe. Horn long straight erect black with an orange basal line on each side, freely movable along axis of body.'

'Final instar: very similar to above; subdorsal stripe extending to 3rd somite, white dots tinged with orange. Traces of a dull orange-brown sublateral line speckled with white. Spiracles orange. Horn laterally compressed slightly constricted at base, apically blunt.'

It is obvious that the larva is extremely variable. However, it is usually easily recognised by its small size, approximately one inch long when fully grown. The caudal horn seems to be invariant in size, shape and colour.

The larva feeds on Rubiaceae chiefly species of *Galium*. The pupal stage varies, most imagines emerging after about seven days but a few require 15 to 20 days.

Atemnora westermanni Boisduval

I have found the imago but never seen the larva. Sevastopulo describes the East African form as follows:

'Mature larva: thoracic segments tapering sharply to a small round green head. Body rather stout green; a fine blue-black dorsal line entire on somites 2 to 4 interrupted at rear of each somite from 5 to 11. Dorsal area sprinkled with white dots which form rough oblique dorsolateral stripes, the one on 7 and 8 terminating laterally in four large creamy white dots. A dark olive-green oblique stripe edged below with whitish green from the subdorsal area of the 10th somite to the base of the horn. Horn stout down-curved, dull-slate blue, with two large cream lateral spots at base. Spiracles very dark blue. Legs pink, venter and prolegs green.'

The food plant⁵ is *Strychnos* sp.

Basiothia charis Boisduval

Although the imago was taken on several occasions the larva was not found. Pinhey⁵ quotes Townsend's description of a larva already enclosed in a cocoon and probably discoloured and describes a larva in the Transvaal Museum.

Townsend's description indicates 'a blackish brown larva with many wavy black longitudinal lines. Head black; horn fairly long, white with black pimples. Eyespots circular very dark grey above, black towards sides. Each has an oval ochreous thread-line in the circle; and inside the oval in the front eyespot, a white horizontal line.' The Transvaal Museum larva is reported as 'chocolate with head paler more reddish, the horn browner and slender, short yellow dorsolateral and lateral stripes on thorax (segments one to three) and a yellow stripe down last segment descending from horn. Yellow spiracular dots. Eyespots on 4 and 5

purplish black, that on four marked with cream in upper half.' It is reported to feed on *Vernonia*.⁵

A very poorly preserved small larva in the British Museum agrees the details given by Townsend and described from the Transvaal Museum larva.

Basiothia medea F.

Again although the moth was not uncommon in Southern Nigeria the larva was not found. The following descriptions are all reported from Pinhey:⁵ According to Rothschild and Jordan the larva has seven triangular patches down the back which are brown dorsally, yellowish at sides; the spot on the eleventh segment is elongated and reaches on to the horn. Townsend describes it as a delicate blue-green with rough surface. Eye spot at first bright green in the centre, ringed with lemon yellow, with a black dash above and below. When full grown it is greener; eye-spot in the centre very dark blue almost black. The next segment has a pink and white kidney-shaped spot. There are elliptical pink spots along the sides and above these are conspicuous black triangles. Horn black, on a reddish base. Feeds in Kenya (Townsend) on *Pentanisia* and *Pentas*, in South Africa on *Richardsonia* and *Spermacoce*. A Transvaal Museum larva has the fourth segment swollen; a short thin horn. In a brown form the markings are similar; with whitish lateral stripes; spiracles white. It is a younger larva and the horn is longer and more slender. James M. Stark said of the larva 'pinkish brown minutely spotted white with white stripes running from back (dorsum) to spiracles; skin folds under spiracles white. Underside fawn. Tail a quarter inch, soft dark brown, head dark brown.' No eyespots on body. Poncelet found two forms on a very small cruciferous plant. A green form, head and body pale green, black eye-spot on first abdominal (fourth body) segment, eight brown dorsolateral triangles each edged outwardly with white, the last triangle joining the base of the horn. The other form was all brown.

The British Museum has three blown larvae one green, one brown and the other black. Only the brown form will be described in detail as the markings on the other two are the same, but those on the black form are more difficult to distinguish. The head and general body colour are pale brown. There is a faint paradorsal line. On each side of the dorsum on segments 4 or 5 to 12 there is a dark chocolate triangular patch; corresponding to this just below the paradorsal line is a thin dark chocolate line. (The dark patches on the back could be considered as irregularly circular dorsal-subdorsal patches through which the pale paradorsal band runs. Under certain circumstances each of these could appear as an eye.) Anteriorly the patches on segment 5 and the triangular patches are joined by a chocolate band. Also on segment 5, in the paradorsal band is a very dark eye-spot. There are supra- and subspiracular brown lateral lines and on segments 7 to 11 chocolate roughly triangular patches. The caudal horn is thin straight and pointed, dark brown or black in colour. In the green form the supra- and subspiracular lateral lines are absent. The paradorsal lines are pale pink and only visible in the dark patches. There is a pale broad chocolate band on segments 2 to 4. In the pale form chocolate and brown markings appear to be replaced by shades of green and yellow.

Euchloron megaera L.

I have not seen the larva of this beautiful hawk moth myself and the only description I can find is that of Pinhey⁵ of a dried specimen in the Transvaal Museum, 'reddish pink shaped like a *Hippotion* with segments 4 and 5 swollen. A red-

centred white eye-spot on segment 4; a laterodorsal white stripe. It feeds on Grape Vine and *Ampelopsis*.

There are two reasonably well-preserved blown larvae in the British Museum collection which have enabled further details to be added (Fig. 8).

Dark form. The general colour of the larva is dark chocolate-brown, with paler brown markings and areas. The chocolate-brown head has a pale creamy brown (possibly cream in life) band running as a continuation of the mediodorsal line down the front of the face widening over the basal half until it is the width of the mouth parts. The dark chocolate mediodorsal line is continuous on segments 2 to 6, and 11 to 12, but broken anteriorly on other segments. At intersegmental folds the dorsum is paler brown. The creamy paradorsal lines edged dorsally a deep chocolate are broken or may be reduced to a short dash on segments 7 to 10 but are continuous through segments 11 and 12 into the base of the caudal horn; pale continuous lines edged dorsally dark on segments 2 to 4, but none on segments 5 and 6. There are dorsal eye-spots anteriorly on segment 5 dark above creamy on lower half (the dark portion is probably deep blue in life). There are five pale side stripes the first running ventrally on the anterior of segment 5 to meet the dorsal line at the joint between segments 6 and 7; the remainder run parallel to this each starting on the next segment posteriorly and the last ending on the joint between segments 10 and 11. At the junction of these stripes with the paradorsal line there is often a marked white circular patch in both light and dark form. Spiracles black with pale brown ring. The caudal horn is vestigial strongly down curved and purple in colour.

Pale form. This is very similar to the dark form with dark green substituting for chocolate and pale green or white for the paler areas. The caudal horn is however unchanged, the line down the face is dark green and the upper portion of the eye is scorched or absent in the blown specimen (this is probably pink in life). It is probable that laterally and dorsally the larva is suffused with pink—but a live specimen would be needed to confirm this.

Hippotion osiris Dalm.

Seitz² mentions that the larva is similar to that of *celerio*. Pinhey⁵ says general colour is normally brown although Seitz quotes the colour as green. I have only found the dark form for certain in West Africa.

This larva has an orange-red head. Segments 2 to 4 are pale pink with broad black lateral bands and a very broad broken dorsal one. A very thin black mediodorsal line can be traced through the whole length of the larva to segment 12. Segment 5 bears a grey blue eye-spot in which there are six whitish dots; this is surrounded by a broad very dark black ring. There is a suggestion of a second eye-spot on segment 6 but this is obscured by the colouring. Each of segments 5 to 11 is deep blue-black with a paradorsal posterior pink spot and a thin pink supraspiracular lateral line. The black on the segment is made up of many fine wavy black longitudinal lines. There are a number of very small pink lateral spots randomly scattered and a suggestion of a pink diagonal side stripe running ventrally and anteriorly. The anterior and posterior edge of each of these segments is pale pink. The legs are orange and the prolegs white or pink. Segment 12 anterior to caudal horn black, posteriorly pink; segment 13 and anal flap and claspers mainly pink. The caudal horn is very short, cream coloured.

Several blown larva in the British Museum are identical to the above description except that, almost certainly as a result of blowing, black is replaced by dark brown and pink by white.

Pinhey's⁵ description as far as it goes agrees with the above, but he adds that

when the larva is young the horn is long and black. However, his illustration is not in the least like the West African larva or those in the British Museum.

The larva feeds on *Ipomea involucrata*, *Ipomea cairica* and *Anchomenes difformis* in West Africa. Pinhey reports Grape-vine, Fuchsia, *Impatiens*, *Cissus*, and *Richardsonia* as food plants.

The pupal stage lasts about two weeks.

Hippotion celerio L.

The larva is extremely variable but since the moth occurs not only in Africa but in most of the tropical and subtropical areas of the old world including Australia and is a regular immigrant to much of Europe, it is not surprising that it has been described many times. Buckler⁹ and Tutt¹¹ give good descriptions of the larva and the former gives a good illustration of the brown form. Pinhey⁵ shows an illustration which is a fair approximation to the green form. Stokoe² however provides no illustration and in my opinion the larva could not be identified from his description. South however gives a good illustration of the dark form.¹⁷ In West Africa both light and dark forms occur.

Light form. The half-grown larva is pale green with a yellow-green head with a yellow band just over the mouthparts. A dark green mediodorsal line runs from segment 2 to the base of the caudal horn on segment 12. There are yellow paradorsal bands arising on segment 3 which run the whole length of the body into the base of the caudal horn on segment 12. Anteriorly on each of segments 7 to 11 on the ventral side of the paradorsal line is a black spot. Laterally on each of segments 6 to 11 there are between three and five short vertical black lines situated mainly below but also above the paradorsal line, and above the level of the spiracles. Spiracles are white surrounded by a black ring, with the centre slit black. The eye-spot on segment 5 is greyish blue in the centre with six or seven darker spots, surrounded by a thin white ring outside which is a broad yellow ring enclosed by a thin black line. Another eye-spot occurs on segment 6 much smaller and is entirely yellow surrounded by a thin black line. The caudal horn is long, about a third the length of the larva and coloured black. It is readily movable over the back. The legs are pink, and the prolegs yellowish or green.

The fully grown larva is more emerald green than yellow-green, paradorsal lines are white, and there is a faint broken subspiracular lateral line from segments 3 to 12. There are also seven diagonal lateral stripes on segments 5 to 12 each stripe commencing at the midpoint of the paradorsal line on one segment and running downward anteriorly through the next segment and finishing on the subspiracular line on the next one. The caudal horn is thin black and straight. The thin vertical black lines on segments 6 to 11 occur on both sides of the paradorsal line. The eye-spot on segment 5 is now about four times the size of that on segment 6.

Dark form. The dark form of the larva is very similar to the light one except that the ground colour is some form of brown, the band and lines are brown or pink. The eye-spots on segment 5 still however have colour dots in the centre of the eye. The caudal horn appears to be the same and the short vertical lines adjacent to the paradorsal lines are still present. Most of the obvious variations occur.

In West Africa larva has been found feeding on *Ipomoea involucrata*, *Ipomoea cairica*, and *Anchomenes difformis* whilst Pinhey⁵ reports Grape Vine, *Cissus*, *Impatiens* and *Rumex* as well as these.

Hippotion eson Cramer

The larva has both a green and a brown form. The markings and general description of each is the same except that in one the markings are brown or brownish and in the other green or greenish. Only one description, that of the brown form is given. If the green form is kept in the dark for more than 24 hours it usually changes to the brown one.

The head of the larva is brown, and sometimes with a whitish mark on the face. There are very thin black-brown mediodorsal and paradorsal lines from segments 2 to 12 and the paradorsal lines end in the base of the caudal horn. On segments 2 to 4 there are broad spiracular lateral bands of dark brown and a similar rather broad mediodorsal one; there are also a few thin brown lines between the mediodorsal lines and the lateral bands. The large eye-spot on segment 5 is dark blue-black or sometimes deep chocolate, surrounded by a dirty brown-green ring which is finally enclosed by a black line. (In the green form this eye is composed of a dark green centre, a paler green ring with the outer line dark green.) The eye-spot on segment 6 is a dirty pink surrounded by a dark line. Slightly anterior to the centre of each of segments 7 to 11 there are two short transverse lines arising from the paradorsal lines. A subspiracular lateral line runs from segment 6 to 12. The dorsum is dark between the paradorsal lines and on segment 12 anterior to the caudal horn there is a markedly dark patch. Laterally the colour is pinkish brown from segment 6 posteriorly. There are very faint pale lateral diagonal lines on segments 5 to 12. Each diagonal starts in the middle of a segment just below paradorsal line and runs downwards anteriorly meeting the subspiracular line at the midpoint of the next segment. Immediately below each diagonal between the segmental joint and the subspiracular line there is a dark brown slightly curved triangle. Spiracles in pale portion of side, dirty cream with inner slit black. The legs are pink, the prolegs grey with claspers pinkish. The caudal horn darkish dorsally but otherwise a dirty cream in colour, slightly bent dorsally.

In West Africa the larva was found on *Ipomea involucrata*, *Ipomea cairica*, and *Anchomenes difformis*. Pinhey reports Arum Lily, Grape Vine, Fuchsia, *Ampelopsis*, *Richardia caladium* and *Impatiens* as food plants.

The pupal stage takes about two weeks.

Hippotion balsaminae Walker

The larva in the penultimate instar is a bright green with a bluish or blue-green thin mediodorsal line. The head is green. From segment 6 to 12 there is a broad white paradorsal line ending in the side of the caudal horn with an orange dot; the dorsal side of this line is edged with dark green from segment 6 to segment 11 and on segment 12 in black. The spiracles are white vertically oval and surrounded by a thin black line. A large eye-spot on segment 5 has a dark green centre surrounded by a yellow band, the whole being encircled with a thin black line; the circular shape is less perfect than in other species. The second eye-spot on segment 6 is pale yellow surrounded by a thin black line; it is elliptical with the major axis longitudinal. The legs are pale pink. The caudal horn is thin slightly curved ventrally and coloured black with a white tip. The whole of the body from segment 6 to 12 is covered with short longitudinal dark green dashes. There are very faint suggestions of lateral green side stripes passing anteriorly downward.

The fully grown larva is very similar to the above but the dorsum is often darker than the rest of the larva, the white side stripes are plainer and the paradorsal lines fainter. On each of segments 6 to 12 there is a posterior small white spot just above paradorsal line and occasionally a half eye-spot on the dorsal side of this line coloured blue black. Forelegs pink.

Pinhey⁵ reports the larva is green with a brown middorsal line with small black eye-spot on segment 5* and a red one on segment 6 both encircled by a white line. Carcasson⁴ says larva is unknown.

The West African larvae were found to feed on *Anchomenes difformis*, *Ipomoea involucrata* and *Ipomoea cairica*. Pinhey⁵ gives *Jussiaea repens* and possibly *Impatiens* as the food plant.

The pupal stage lasts between two and three weeks.

Theretra orpheus H.-S.

The imago occurs not uncommonly in West Africa but the larva was not found, probably because of the general inaccessibility of the food plants which according to Pinhey⁵ are epiphytic orchids such as *Angraecum*, *Ansellia africana* and *Polystachys*. Pinhey⁵ describes a larva in the Transvaal Museum as yellow (green in life) with very broad brown dorsal band interrupted by V-shaped chevron-like marks as in a fish-bone pattern; a brown lateral band across the spiracles. Head round and brown, horn unfortunately broken off. Eye-spot on 4 brown ringed, then yellow with the pupil black in forward half, brown postdorsally with a few white dots in the pupil.

Centroctena rutherfordi Druce

Pinhey⁵ does not mention this species so it probably has not been recorded from South and Central Africa. Carcasson⁴ says the early stages are unknown. This rather extraordinary larva I have only seen in a dark form. It may occur as a green one though for reasons stated later this is doubtful.

The head is grey with a number of dark lines (see Fig. 9). The back of the head is brown with two paler bands each side edged with a thin dark line; this band passes paradorsally through segments 2, 3 and 4 to the large eye-spot on segment 5. There is a dark brown dorsal line on segments 2 to 5. Segments 3, 4 and 5 are much swollen. Dorsally segments 4 and 5 are dark grey and segment 5 has a very thin black paradorsal line. On segments 2 to 4 there is a supraspiracular lateral dark brown band with a thin very dark brown band each side of it and one down the middle, with five or six vertical brown lines across them, some of which extend across the paradorsal line. (The result is a fish net effect over the dorsum and upper parts of the sides.) There is also a pale cream or pinkish serrate spiracular band. There is a subspiracular lateral band composed of numerous dark brown dots which can be traced the whole length of the larva although it is obliterated by darker markings in parts. Segment 5 is otherwise pale cream or slightly pink on the lateral and paradorsal areas.

On segments 6 to 11 there are broad paradorsal white bands from which five broad lateral white diagonals, one on each of segments 6 to 10, run anteriorly downwards to finish subventrally on the anterior segment. At the junction of the diagonal with the paradorsal line is a faint yellow spot. Otherwise segments 7 to 10 are laterally black roughly in the shape of a triangle the tip of which shades into the paradorsal line as a pinkish faintly olive extension. In the centre of each segment 6 to 10 laterally about the spiracular level there is a broad white or cream vertical band in length about half the larval height. Segment 11 is mainly cream with a number of scattered, short, deep brown dashes and a broad band running posteriorly sharply downward from the anterior supraspiracular segment edge to just meet the posterior edge subventrally. Segment 12 is humped and swollen but there is no caudal horn. The whole of the dorsum from segment 6 posteriorly

* Pinhey says segments 4 and 5 have eye-spots. But he does not count the head as segment 1 so the segment number has been corrected to this nomenclature.

is covered with 20 to 24 thin longitudinal broken dark brown lines over a faint greenish background. On the anterior of each of segments 6 to 11 there is a short mediodorsal black line; these bands become very faint in segments 12 and 13 where the dorsum is nearly white. On segment 5 there is a large eye-spot anteriorly, very dark in the centre with a pale ring round it, the whole enclosed in dark line. The eye appears to stand out from the head.

The larva feeds on *Ipomea cairica*, a plant which grows over the ground and in this situation the superficial resemblance to a very young Gaboon viper is very striking, and probably acts as a protective coloration against lizards and other possible predators. The pupal stage occupies two to three weeks.

DISCUSSION

Although the larvae of Sphingidae are, because of their size and usually conspicuous habits, probably as well known as any group of larvae, it is surprising to find that except for those hawk moths which occur in temperate regions relatively few have been adequately described. Superficial description may adequately identify a non-variable larva such as *Sphinx ligustri*, but for tropical species, which often have two or three markedly different forms plus a number of minor but important variations, as well as exceedingly similar appearance not only between closely related species but also between species occupying similar habitats, only the most accurate observation and comparison suffices adequately to distinguish between them. My own early descriptions I found eventually to be quite unsatisfactory but was fortunately able to repeat nearly all of them.

The most invariant features of the sphingid larvae appear to be, the head, which except for apical horns or protuberances that often vanish in maturity, usually does not change throughout the larval existence and the caudal horn which although it may change from instar to instar is a feature that does not change certainly in the final instar through all the larval variations.

The caudal horn seems to be invariant in colouring and in structure, but the curvature may not be so. There seems to be some variation, certainly it changes from instar to instar.

The head markings are also a good guide and seem to be completely stable although just how far they are the same in light and dark forms needs to be determined.

Any structural features of the body such as spines, setae, tubercles, pimples and often spiracles seem permanent and have proved most helpful in separating closely allied species.

Once again a key has been given as a conclusion to this paper. Pinhey also gives a key to the Eastern and Central African hawk moths, but this covers only a few of the West African species. The question of trying to fit the West African species into Pinhey's key was considered, but it was thought that insufficient data was available on some aspects of the larvae described by Pinhey to enable certain West African species to be unequivocally separated by this key. Also I am not myself convinced that Pinhey's characters for splitting the larvae into two divisions are always sufficiently obvious. A key to the West African larvae has been provided. Owing to the very good descriptions by Sevastopulo quoted by Carcasson it has been possible to include in the key a number of West African larvae which I have not myself seen. Any larva of a species occurring in West Africa for which sufficient description has been found has been included in order to make the key as complete as possible, and the description quoted in the text. How successful this has been only time will tell. The obvious task for the future is to incorporate Pinhey's and the present key into a single whole. To this end I

would be pleased to receive specimens of preserved larvae from anywhere in Africa south of the Sahara and particularly colour transparencies of these larvae.

That one day it will be possible to make a single key for the whole of the hawk moth larvae seems at the moment doubtful, so similar are some larvae evolved in similar biological micro-environments that it is likely that any key will to a greater or lesser extent depend on a geographical separation.

Preserved larvae are not always very helpful in obtaining good descriptions; blown larvae have so often lost all colour, the horn and head are so often scorched that they are useless. Freeze dried material appears excellent, although I have only seen palaearctic material. Larvae preserved in spirit can be good but often the liquid alters the larval colours. Good coloured transparencies, showing dorsal and lateral aspects, plus a good view of the face are most helpful. In their present form the two keys will probably not cover unusual larval varieties.

Just how much variation occurs even in structural features is a completely unknown factor but there are hints that these occur. Pinhey's descriptions of *N. accentifera* larvae show variation in shape of the thoracic segments and in the shape of the 'hood' effect and some variation in length of horn (length of horn particularly if the end is blunt may be misleading as the tips are very easily broken).

The larvae of many closely allied species show great similarity. *H. convolvuli*, *A. atropos*, *C. mauritii* and *X. morgani* are obviously closely related; *Polyptychus* larvae are remarkably similar and those of the *Hippotion* obviously belong to a single generic group. The greatest variation within a group occurs with the *Nephele* and *Tennora* where it can be difficult to assign a larva to the correct genus, it could be that there is a third genus mixed in with them.

The plant names given by myself are taken from Hutchinson & Daziel¹⁸ but where I have quoted from another author they are as given by him.

In conclusion I would like to thank the British Museum (Nat. Hist.) for access to their collections, and particularly Mr. Hayes for his help in checking identification of the imagines of several species.

KEY TO LARVAE OF
WEST AFRICAN SPHINGIDAE
(Larvae assumed to be in the final instar)

1	<i>a</i>	Larva with an eye-spot on segment 4 or 5	34
	<i>b</i>	Larva without an eye-spot	2
2	(1) <i>a</i>	Larva with numerous long spines or short setae	3
	<i>b</i>	Larva without long spines or short setae	6
3	(2) <i>a</i>	Body covered with a fuzz of white setae. Caudal horn black with pale lilac spines	<i>X. morgani</i>
	<i>b</i>	Body without white setae. Caudal horn without pale lilac spines. Many short spines on paradorsal lines on segments 2 to 4	4
4	(3) <i>a</i>	Spines long and black with short branches. Caudal horn similar	<i>L. demolini</i>
	<i>b</i>	Spines not so	5
5	(4) <i>a</i>	Spines long, simple, mostly yellow; those on segments 11 to 14 red	<i>A. gussfeldti</i>
	<i>b</i>	Spines pale lavender, quite short. Caudal horn absent .	<i>R. hornimanni</i>
6	(2) <i>a</i>	Head round or oval	7
	<i>b</i>	Head triangular	20

7 (6) a	Head with vertical stripes dark	8
b	Head without stripes or stripes pale coloured	11
8 (7) a	Segments 2 to 4 plain smoothly rounded, not swollen so as to appear thicker than segments 5 to 12. Caudal horn smooth	<i>H. convolvuli</i>
b	Segments 2 to 4 either appear swollen and thicker than segments posterior to them or not smooth. Caudal horn not as above	9
9 (8) a	Segments 2 to 4 tubercular, lumpy or with sharp setae. Horn black or dark brown, slender end very slightly tubercular	10
b	Segments 2 to 4 smooth but swollen. Horn very short, coloured as body covered with large tubercles often tipped with black or a colour darker than the body	<i>A. atropos</i>
10 (9) a	Segments 2 to 4 with large tubercle-like lumps and a few narrow ones like short blunt broad spines	<i>C. mauritii</i>
b	Segments 2 to 4 and sometimes 5 and 6 with paradorsal line covered with short broad-based sharp setae	<i>X. morgani*</i>
11 (7) a	Horn very long ($\frac{1}{3}$ of body length), completely black. Mature larva very small	<i>S. nana</i>
b	Horn not so long in comparison to body. Larva larger	12
12 (11) a	Segments 2 to 4 flat on top and apex of head tending to be flat, giving thoracic portion of larva a square look. Pale bands on sides of head running into paradorsal lines	19
b	Larva not so	13
13 (12) a	Head laterally and/or segment 2 thickly covered with small yellow pimples†	14
b	Head and segment 2 without small yellow pimples	15
14 (13) a	Segment 2 and anal claspers yellow. No lateral bands on head	<i>C. hylas</i>
b	Segment 2 and anal claspers red brown or coloured as body. Head with yellow lateral bands. Legs white	<i>N. comma derasa</i>
15 (13) a	Larva with a lateral pale triangular patch on segments 11 and 12	16
b	Larvae without such a patch	17
16 (15) a	Caudal horn short, broad, blunt with a small apical dorsal spine. Colour purple. Mediodorsal line clear on segments 2 to 12. Dorsal V on segments 11 and 12, point at base of horn darker with arms at a wider angle	<i>N. accentifera</i>
b	Caudal horn, longer, thin and bluntly pointed, brown or black. Dorsal line evanescent on segments 5 to 12. Dorsal V on segments 11 and 12 with a narrower angle and lighter	<i>N. rosae</i>
17 (15) a	Two large cream lateral spots at base of slate blue caudal horn	<i>A. westermannii</i>

* Only appears here when bulk of setae on body have been removed by rough handling.

† On the pale form these may not show up well since whole body is covered with pimples, but they are more numerous on segment 2.

	<i>b</i> Larva without such spots	18
18 (17) <i>a</i>	Caudal horn short, stout, rounded and tubercular, deep brown in colour with darker mottling, or yellow with black tubercles. Head normal size	<i>N. aequivale</i> ns
<i>b</i>	Caudal horn moderately long black strongly concave ventrally. Head rather small, and at rest retracted so that segments 4 and 5 become swollen giving the larva a cobra-like appearance	<i>N. oenopion continentis</i>
19 (12) <i>a</i>	Larva with clear dorsal pattern at least on segments 8 to 10	20
<i>b</i>	Larva without such a pattern. Head without lateral bands. Paradorsal line white, edged dorsally green	<i>Tennmora sumosa</i>
20 (19) <i>a</i>	Segments 5 to 11 with a small red mark anteriorly on dorsal line; mark in shape of a simple chess pawn, its base anterior to segment. (Fig. 3) Paradorsal line white	<i>T. livida</i>
<i>b</i>	Dorsal marks not as above	21
21 (20) <i>a</i>	On each segment (2 to 11) faint criss-cross marking, the centre of the cross being a dark rhomboidal patch (Fig. 4). Paradorsal line pink.	<i>T. funebris</i>
	Dorsal marks not as above	22
22 (21) <i>a</i>	Each of segments 4 to 11 with a yellow dorsal mark anteriorly in the shape of a 'Y' with the open end of the V placed at anterior edge of the segment (Fig. 6)	<i>T. sardanus</i>
<i>b</i>	At least each of segments 8 to 10 with a red mark in the form of a stylised flower (Fig. 7). The mark is surrounded by a diffuse yellow edge	<i>T. reutlingeri</i> *
23 (6) <i>a</i>	Apex of head of larva raised noticeably above level of segments 2 to 4. Very sharply pointed	24
<i>b</i>	Apex of head of larva relatively blunt	25
24 (23) <i>a</i>	Caudal horn, average size, yellow, sharply concave ventrally	<i>Andriasa contraria</i>
<i>b</i>	Caudal horn very small almost absent	<i>L. oweni</i>
25 (23) <i>a</i>	Caudal horn yellow	28
<i>b</i>	Caudal horn not yellow	26
26 (25) <i>a</i>	Caudal horn blue or violet	31
<i>b</i>	Caudal horn not blue or violet	27
27 (26) <i>a</i>	Caudal horn black, long and slender.	<i>Polyptychus mutatus</i>
<i>b</i>	Caudal horn purple red	<i>Neopolyptychus compar</i>
28 (25) <i>a</i>	Lateral oblique stripes yellow	29
<i>b</i>	Lateral oblique stripes white	<i>Platysphinx constrigalis</i>
29 (28) <i>a</i>	Paired dorsal blue spots (red in young larva) on each of segments 2 to 11	<i>F. falcata</i>
<i>b</i>	Paired dorsal blue spots absent	30
30 (29) <i>a</i>	At base of caudal horn, a patch of black dots enclosed in a black ring	<i>Platysphinx stigmatica</i>
<i>b</i>	Larva covered with black or yellow pimples except on last segment where some of pimples are red	<i>Polyptychus grayi</i>
31 (26) <i>a</i>	Larva with white or purple lateral patches	32

* *Tennmora* larvae tend to turn purple when kept in the dark or when about to pupate, this may mask the dorsal marks and/or alter their colour. There is an alternative for sections 17 to 20 given at the end of this Key.

<i>b</i>	Larva without such patches. Oblique side stripes white. Lilac area below paradorsal line	<i>N. serrator</i>
32 (31) <i>a</i>	Larva with seven pinkish violet dorsolateral patches, each with a white lateral spot directly below	<i>N. pygargus</i>
<i>b</i>	Lateral patches white	33
33 (32) <i>a</i>	Between one and five lateral patches in paradorsal line each with a small red spot immediately adjacent to it dorsally	<i>N. compar</i>
<i>b</i>	Normally ten lateral patches on paradorsal line. Each patch consisting of two to four separate ovals; the anterior patches are the most divided. No red spot above patches	<i>N. rosea</i>
34 (1) <i>a</i>	Larva with caudal horn vestigial or absent	35
<i>b</i>	Larva with caudal horn well formed	36
35 (34) <i>a</i>	No caudal horn at all. Segments 5 and 6 greatly swollen. Head grey with brown marks	<i>C. rutherfordi</i>
<i>b</i>	Very minute pink or purple caudal horn	37
36 (34) <i>a</i>	Larva with one eye-spot	<i>T. orpheus</i>
<i>b</i>	Larva with two eye-spots	38
37 (35) <i>a</i>	Head unmarked red orange in colour. Caudal horn straight	<i>H. osiris</i>
<i>b</i>	Head not as above. Caudal horn purple strongly con- cave ventrally	<i>E. megaera</i>
38 (36) <i>a</i>	Caudal horn purple tipped with white. Side stripes well marked broad and purple oblique ventrally and posteriorly	<i>P. benitensis</i>
<i>b</i>	Caudal horn not purple, side stripes not purple	39
39 (38) <i>a</i>	Caudal horn yellow, short and stout with a thick black ring near apex	<i>D. nerii</i>
<i>b</i>	Caudal horn not yellow	40
40 (39) <i>a</i>	Caudal horn entirely black	41
<i>b</i>	Caudal horn white and black	42
41 (40) <i>a</i>	Larva with dorsal triangular patches on segments 4 or 5 to 12. Patches are coloured brown or deep black becom- ing yellow or white toward the edges	<i>B. medea</i>
<i>b</i>	Larva without such dorsal triangular patches	<i>H. celerio</i>
42 (40) <i>a</i>	Caudal horn black with apical third white. Spiracles bright white	<i>H. balsaminae</i>
<i>b</i>	Caudal horn different	43
43 (41) <i>a</i>	Caudal horn white covered with black pimples. Spiracles yellow	<i>B. charis</i>
<i>b</i>	Caudal horn with dirty white sides, dorsally body coloured, runs into dark, body-coloured triangle on dorsum of segment 12. Spiracles faintly lighter than background	<i>H. eson</i>
ALTERNATIVE KEY TO TEMNORA		
19 (12) <i>a</i>	Paradorsal lines yellow	<i>T. sardanus</i>
<i>b</i>	Paradorsal lines not yellow	20
20 (19) <i>a</i>	Paradorsal line white	21
<i>b</i>	Paradorsal line pink or pinkish on segments 2, fainter on 3 and 4	22

21 (20) a	Head without a lateral band along the side	<i>T. fumosa</i>
b	Head with a white lateral band	<i>T. livida</i>
22 (20) a	Head without a lateral band	<i>T. reutlingeri</i>
b	Head with a pink lateral band	<i>T. funebris</i>

REFERENCES

1. MacNulty, B. J., 1966, *Proc. S. Lond. ent. nat. Hist. Soc.*, **1966(3)**:69-84.
2. Seitz, A., 1930, *Macrolepidoptera of the World*, **14**.
3. MacNulty, B. J., 1967, *Proc. S. Lond. ent. nat. Hist. Soc.*, **1967(1)**:1-12.
4. Carcasson, R. H., 1967, Revised Catalogue of African Sphingidae *J. East Afr. Nat. Hist. Soc. & Nat. Mus.*, **26(1)**.
5. Pinhey, E., 1960, *Hawkmoths of Central & South Africa*, Longmans.
6. South, R., 1961, *The Moths of the British Isles*, Series I, p. 32, Frederick Warne.
7. Stokoe, W. J., 1948, *The Caterpillars of the British Moths*, Series I, p. 39, Frederick Warne.
8. Poulton, E. B., 1888, *Trans. Ent. Soc. London*, **1888**:515.
9. Buckler, W. *Larvae of British Butterflies & Moths*, **2**:226.
10. Newman, L. W., *Entomologist*, **8**:272.
11. Tutt, J. W., 1904, *A Natural History of British Lepidoptera*, **4**, Swan Sonnenchein.
12. Boisduval, J. A., (Doubleday's Translation), *Entomologist*, **6**:561.
13. Stuart, 1896, *Ent. Rec.*, **7**:226.
14. Newman, L. W., 1841, *Entomologist*, **2**:281.
15. Chauvette, *Zoologist*, **9**:3242.
16. Roche, P., *Private Communication*.
17. South, R., 1930, *The Moths of the British Isles*, Series I, 1, Frederick Warne.
18. Hutchinson, J. and Daziel, P. J. M., 1928, *Flora of West Tropical Africa*, London.

PROCEEDINGS

14th MAY 1970

A Vice-President, Col. A. M. EMMET, in the Chair

The following new members were declared elected: Messrs. D. Lonsdale, S. T. Farmer and R. U. Vane-Wright.

EXHIBITS

Col. A. M. EMMET—(1) The first British example of *Stigmella paradoxa* Frey (*nitidella* Hein.) (Lep., Nepticulidae), bred from *Crataegus*, Wicken Fen, Cambs., 24.iv.70. (2) Representatives of lepidopterous species which should be taken on the field meetings on 16th and 17th May: *Euyponomeuta stanella* Thunb. (Yponomeutidae), which could be looked for as larvae on *Sedum telephium* L. at Dovedale; and on *Vaccinium vitis-idaea* L. at Great Hucklow, *Lozotaenia fosterana* F. (Tortricidae), *Rhopobota ustomaculana* Curt. and *Olethreutes mygindana* Schiff. (Olethreutidae), *Coleophora visitella* Gregs. (Coleophoridae), *Phyllonorycter junoniella* Zell. (Lithocolletidae) and *Fomoria weaveri* Staint. (Nepticulidae).

Mr. C. O. HAMMOND—The uncommon and very local Homeless Bee, *Nomada leucophthalma* (Kirby) (Apidae), parasitic on *Andrena clarkella* (Kirby) and

A. apicalis Smith (Hym., Apidae); both early species. Taken on Chobham Common, 3.v.70.

Mr. A. E. STUBBS—Three species of Bombylidae (Diptera) taken in Morocco in August 1968.

Mr. G. M. DE ROUGEMONT—The following Coleoptera (Carabidae): *Badister sodalis* (Duft.), two examples from Knole Park, Kent, 8.v.70; *Masoreus wetterhali* (Gyll.), a single example from Deal, Kent, 10.v.70; and *Harpalus azureus* (F.) also from Deal, 10.v.70.

COMMUNICATIONS

It was announced that Mr. E. W. Classey had presented to the Society a number of journals for sale to the members at 10s. each, the proceeds going to the Centenary Fund.

Commenting on the season, Mr. R. F. BRETHERTON said that since the temperature had risen a little at night he wondered if there had not been a minor influx of migrants. On the evenings of 2nd and 3rd May a female *Agrotis ipsilon* Hufn. (Lep., Noctuidae) and an example of *Nomophila noctuella* Schiff. (Lep., Pyralidae), both migrant species, had come to his mercury vapour light at Bramley, Surrey.

Col. A. M. EMMET discussed the six oak-feeding species of Nepticulidae (Lep.) which at one time had been grouped under *Stigmella atricapitella* Haw. He had recently bred 10 or 12 examples and could tell from external characters, without referring to the genitalia, that he had four of the species and may very well breed all six. He said the mines were different too, and suggested that micro-lepidopterists might breed this moth and carefully note the larval habits and mines in relationship to the species which eventually emerged.

Referring to Mr. Bretherton's remarks about a migration, Mr. G. PRIOR said that he had received a report of two or three *Colias croceus* Fourc. (Lep., Pieridae) being seen at Northwood, N. London, though he had not seen them.

Professor H. E. HINTON F.R.S. gave a talk on 'A Scanning Electron Microscope Study of Structures Producing Colour in Insects', which he illustrated with slides of electron micrographs of microsculpture, etc. He afterwards answered a great many questions on structure and techniques.

28th MAY 1970

The President, Dr. B. J. MACNULTY, in the Chair

The following new members were declared elected: Messrs. N. G. Turok, T. Moxham, M. R. Britton.

EXHIBITS

The PRESIDENT—*Ischnodes sanguinicollis* (Panz.) (Col., Elateridae) taken at Kennet, Suffolk, on poplar which was rotten inside. The imagines appear to leave the inside of the tree and hide in bark crevices; but only in those that have been hollowed out and are inhabited by woodlice. These are not old coleopterous larval burrows occupied by woodlice; they are the wrong shape and as many as three *I. sanguinicollis* were found in a single burrow. They rest at the point of the burrow furthest from the entrance. None were found away from the woodlice, except the original example which was beaten from the foliage of the same tree earlier in the year.

Mr. R. F. BRETHERTON—Second instar larvae of *Stauropus fagi* L. (Lep., Notodontidae) which were eight days old and bred from a Chiddingfold female.

Mr. R. W. J. UFFEN—A single living example of *Phyllonorycter junioniella*

Zell. (Lep., Lithocolletidae) taken on the Dovedale, Derby, field meeting during the week end 16th and 17th May. He also showed some leaf litter in which were the larvae of *Endotricha flammalis* Schiff. (Lep., Pyralidae) from London, W.6, to illustrate the natural habitat of the species.

Mr. D. STIMPSON—The living young of a scorpion of the genus *Buthus*. These were three and a half weeks old and the progeny of a female taken in Augillas, Murcia, in southern Spain.

Mr. C. O. HAMMOND—*Xylophagus ater* Meig. (Dipt., Xylophagidae), a female of one of the four British species of the genus, none of which is common. The fly closely resembles *Dictenidia bimaculata* L., a tipulid fly, but the reddish legs make it a good mimic of some of the ichneumon flies. The exhibited example was taken at Charterhouse, Godalming, 26.v.70.

Mr. A. E. STUBBS—A male *Cheilosia maculata* Fall. (Dipt., Syrphidae) taken at Box Hill, Surrey, 24.v.70. This is mainly a western species, few records are available for the south-east, and none for the London area. A special search of the foodplant, *Allium ursinum* L., at Box Hill revealed the species to be locally frequent; at least 14 individuals being found.

Mr. P. L. COOK—(1) *Meloe violacea* Marsh (Col., Cantharidae), a living female, one of several seen on a river bank on a hillside near Loch Awe, Argyll., 24.v.70. With, for comparison, *M. proscarabaeus* L., taken by Mr. D. Appleton on the Isle of Wight. (2) A living *Tetropium gabrieli* Weisse (Col. Cerambycidae) taken as a pupa in a spruce log, Inverliever Forest, Argyll., 21.v.70. The beetle emerged on 23rd May. The species was previously unrecorded north of Leicestershire.

COMMUNICATIONS

Referring to the possibility of this being a good year for butterflies, Mr. R. F. BRETHERTON said that *Leptidea sinapis* L. (Pieridae) seems to have made a come back at Chiddingfold, Surrey, where he had recently seen a number, mostly males. A week earlier he had also seen the species in Herefordshire.

Mr. G. M. DE ROUGEMONT said that he had recently obtained a larva of *Zeuzera pyrina* L. (Lep., Cossidae) by the river at Bungay, Suffolk.

Agreeing with Mr. Bretherton, Mr. A. S. F. RIPPON said that on the edge of Reading, Berks., where considerable earth disturbance had been taking place by public works, he was surprised to see *Celastrina argiolus* L. (Lep., Lycaenidae) was beginning to emerge in some numbers. Mr. T. G. HOWARTH also reported this species to be abundant in the New Forest, Hants, and in south Devon where he had also seen *Leptidea sinapis* L. The latter though was not common, there being only some half-dozen noted. From the south of Devon he also reported *Polyommatus icarus* Rott. (Lycaenidae), *Pararge aegeria* L. (Satyridae), *Gonepteryx rhamni* L. (Pieridae) and *Erynnis tages* L. (Hesperiidae).

The PRESIDENT said that *Celastrina argiolus* L. was now on the wing in Epping Forest and in the Lee valley *Anthocharis cardamines* L. (Pieridae) was flying in some numbers.

The status of *Celastrina argiolus* L. in Surrey was interesting recalled Mr. Bretherton. After the hard winter of 1962 the species was scarcely seen; but the numbers began to build up again and the insect now appears to be becoming common once more.

The irregularity of occurrence of *Hamearis lucina* L. (Nemeobiidae) was discussed by the President who said that in company with J. A. Downes and L. H. Ennis he had looked for this butterfly at Mickleham, Surrey, from 1930 onwards, finding only a few; but in 1946 it became quite common and then

declined. It now seems to have disappeared from this part of Surrey. He wondered if it might not re-appear in the future. Mr. Bretherton said he had seen this insect in the Cotswolds in company with Mr. J. L. Messenger, and had also noted some at Gomshall, Surrey. Mr. F. T. VALLINS reported that he had not seen the butterfly at Mickleham for the past 15 years. A suggestion was made that the modern interest in home wine making could account for this decline; a vast amount of cowslip flowers are needed for cowslip wine.

Mr. F. T. Vallins also reported rearing some British born *Lycaena dispar* Haw. s.sp. *batavus* Oberth. (Lep., Lycaenidae) having now got them through to pupae feeding on ordinary dock. He said that *Rumex hydrolapathum* Huds. was only necessary if breeding continuation was desired.

Commenting on Mr. Uffen's *Endotricha flammearia* Schiff., Mr. E. S. BRADFORD said he had never found more than the odd example in leaf litter and commented on the short pupal period, 10 days in the example he had bred.

11th JUNE 1970

A Vice-President, Capt. J. ELLERTON, in the Chair

The death was announced of A. E. Curtis and of I. R. P. Heslop.

EXHIBITS

Capt. J. ELLERTON—Larvae of *Catocala fraxini* L. (Lep., Plusiidae) *ex ovis* from a Shetland migrant, given him by Mr. B. Goater.

Mr. B. GOATER—(1) Stems of *Viburnum lantana* L. containing exit holes and empty pupae *in situ* of *Aegeria andrenaiformis* Lasp. (Lep., Sesiidae). (2) Young larvae in their second instar of *Apatele euphorbiae* Schiff. s.sp. *myricae* Guen. (Lep., Noctuidae) *ex ovis* from a female taken at rest in Scotland at the end of May. (3) The lower jaw of an Angler fish (*Lophius*).

Mr. C. O. HAMMOND—Two dipterous species taken on the field meeting at Gomshall, Surrey, 31.v.70: *Apemon marginata* (Meig.) (Mycetophilidae), one of the largest of the fungus gnats, and the only British species of this small genus; *Limonia (Dicranomyia) ornata* (Meig.) a tipulid associated with *Petasites*, the beautifully marked wings make the species unmistakable.

Mr. P. L. COOK—Three species of Elateridae and one species of Cerambycidae from Windsor Park and Windsor Forest: *Elater rufipennis* Steph., two examples on hawthorn blossom, 28 & 29.v.70; *E. nigerrimus* Lacordaire, two examples in red-rotten oak, one in a log, and another in a standing tree, all in pupal cells, 2.v.70; *Megapenthes lugens* Redt., four examples, one male and three females, 27 to 29.v.70; *Anaglyptus mysticus* (L.) ab. *hieroglyphicus* Herbst, a single example on hawthorn blossom, 28.v.70.

COMMUNICATIONS

Several members commented on the effect that the prolonged period of fine weather had had on the season. Dr. C. G. M. DE WORMS remarked that there had been an enormous influx of night flying Lepidoptera to light, and that *Apatele alni* L. (Noctuidae) was enjoying an excellent year; Mr. B. GOATER said that on 10.vi.69 he had recorded 64 species of macrolepidoptera from his mercury vapour light trap at Bushey, Herts, and this year's total stood at 128. Referring to migrants, Mr. R. F. BRETHERTON had detected evidence of a small influx on 9th June, on which date *Agrotis ipsilon* Hufn. (Noctuidae) *Plusia gamma* L.

(Plusiidae) and *Nomophila noctuella* L. were noted in his mercury vapour light trap at Bramley, Surrey. Mr. P. W. Cribb said that *Vanessa cardui* L. (Nymphalidae) was now common on the Isle of Wight.

Capt. J. Ellerton announced the gift of three books to the Society by Mr. S. N. A. Jacobs and thanked him for his generosity.

Mr. P. W. CRIBB gave a talk on 'Reinforcement of Threatened Lepidoptera' which he illustrated with coloured slides of high quality. It provoked an animated and prolonged discussion.

BOOK REVIEW

AFRICAN NOTEBOOK by Norman E. Hickin. Demy 8vo, 160+xiv pp. Hutchinson, 45/-.

Many entomologists aspire to a journey through tropical Africa but it is undeniable that others prefer to enjoy the atmosphere more remotely. Dr. Hickin's 'African Notebook' will appeal to both categories and his readers will profit from the informative and widely ranging subject matter of which entomology forms a part.

The book is written in narrative style and is clearly addressed to a general readership. It relates to a journey with members of his family, but the author also draws upon earlier experiences in Africa, which he modestly discounts. His excellent drawings provide a welcome departure from the more usual photographs and are of outstanding quality. An extensive bibliography is included. Inevitably, such a work does not possess the intimacy and lyrical style of 'A Forest Refreshed' but nevertheless it should appeal particularly to those about to visit the African continent for the first time. The book is well produced and is excellent value.

C. MACKECHNIE JARVIS.

Roeseliana roeselii (Hagenbach) (Salt., Tettigoniidae) in Essex. Whilst working in the Chelmer valley reserve of the Essex Naturalists' Trust I swept in some numbers a cricket, one of which I took for determination. Mr. A. E. Gardner was good enough to identify the insect as *Roeseliana roeselii* (Hagenbach). I drew the attention of Mr. G. Pyman to the existence of the species on the reserve. He had also found the cricket on the reserve and was able to add several other localities to the county distribution and I was able to unearth others. The distribution now appears to be Benfleet, Two Tree Island (ENT reserve), Upminster, Foulness, Brentwood, Chelmer Valley (ENT reserve), Little Baddow (between Chelmer Valley and ENT reserve, on wasteland in vicinity of Little Baddow reserve), Fingringhoe Wick (ENT reserve) and Colne Point (ENT reserve). Thus the species seems to be established at several points right round the Essex coast and to have spread well inland.—F. D. BUCK, 'Seirottrana', New Road, Tiptree, Colchester, Essex., 23rd October 1970.

The Society's Publications

Back numbers of the Society's Publications still in print are becoming scarce. We regret therefore that we have had to reassess their value and new prices have been agreed. These are as follows:—

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* These copies are very scarce and contain papers in great demand. Member's discount cannot therefore be allowed.

A GUIDE TO THE SMALLER BRITISH LEPIDOPTERA by L. T. FORD, B.A.

This important work on the British Microlepidoptera is still available.

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2/6

THE NATURAL HISTORY OF THE GARDEN OF BUCKINGHAM PALACE

(Proceedings and Transactions 1963, Part 2)

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are held regularly at the Society's Rooms, but the well-known ANNUAL EXHIBITION takes place in the autumn in the Conversazione Room at the British Museum (Natural History). Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings. The current Programme Card can be had on application to the Secretary.

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PROCEEDINGS

25th JUNE 1970

The President, Dr. B. J. MACNULTY, in the Chair

EXHIBITS

Mr. C. O. HAMMOND—*Aegeria spheciformis* Schiff. (Lep., Sesiidae), taken at bramble blossom on Thursley Nature Reserve, Surrey, 22.vi.70.

Mr. F. D. BUCK—(1) An article regarding Conservation Year extracted from *Printing World* for 10th June, showing how the process engravers, V. Siviter Smith & Co. Ltd., used by the Society for the blocks we require for our Proceedings and Transactions, are taking their own steps to ensure the noxious chemicals used in block making do not cause pollution of any kind. (2) A short series of *Coccinella divaricata* Ol. (Col., Coccinellidae) from Little Baddow, Essex, 7.vi.70; with for comparison, *C. septempunctata* L. He commented on the differences between the two.

Mr. J. D. INGHAM—A living example of *Volucella zonaria* Poda (Dipt., Syrphidae), taken in his garden at Colliers Wood, S.W. London.

COMMUNICATIONS

Mr. C. O. HAMMOND reported that on Thursley Common, Surrey, on 22.vi.70 he had recorded 15 species of dragonfly.

A newspaper cutting from *The Times* of 24th June referring to the use of a chemical substance by Brazilian wasps to repel ants, was quoted by Mr. D. STIMPSON.

Mr. S. N. A. JACOBS said that *Aegeria spheciformis* Schiff. used to be obtained at Flatford Mill, Suffolk; and Mr. A. STUBBS added that he had obtained an example on Wisley Common, Surrey.

Mr. F. T. VALLINS read a letter from Miss W. M. A. Brooke asking for information about the control of a noctuid moth larva. Mr. T. G. HOWARTH said it appeared to be what the Americans called the 'Army Cut Worm', and added that Agricultural Advisory Services would be able to provide economic advice.

Commenting on the exhibit of *Volucella zonaria* Poda, Mr. Hammond said it was an extremely early date on which to find the species.

Slides of entomological subjects were shown by Mr. P. A. GODDARD and Mr. O. KUDRNA.

9th JULY 1970

The President, Dr. B. J. MACNULTY, in the Chair.

The death was announced of Mr. D. A. Odd.

The following new members were declared elected: Messrs. G. R. Turner, J. D. Ingham and P. A. Goddard.

EXHIBITS

Dr. B. J. MACNULTY—A short series of *Cryptocephalus moraei* (L.) (Col., Chrysomelidae) taken on the Cadsden, Bucks., field meeting, 4.vii.70.

Col. A. M. EMMET—(1) A living imago of *Coleophora wockeella* Zell. (Lep., Coleophoridae) reared from larvae taken in November 1969 at Dunsfold, Surrey. A larval case was also shown. (2) Three examples of *Amelia unitana* Hübn. (Lep., Tortricidae) reared from larvae taken at Dovedale, Derby., on the field meeting of 16th May together with specimens of *A. paleana* Hübn. for comparison. (3) *Laspeyresia leguminana* Zell. (Lep., Olethreutidae) taken at Wicken Fen, Cambs., 24.v.70. (4) An example of *Dechiria turbidella* H.-S. (Lep., Nepticulidae) believed to be the first reared in this country. The mines were found in fallen leaves of a species of poplar in early November 1969 at Wicken Fen. An example of the mine was also shown. (5) *Blastotere laevigatella* Zell. (Lep., Yponomeutidae) reared from a larch twig taken at Ballinahinch, Co. Galway, and is new to Ireland.

Mr. R. F. BRETHERTON—Three examples of *Lycaena dispar* Haw. ssp. *batavus* Oberth. (Lep., Lycaenidae) which Mr. F. T. Vallins had reared from Wood-walton stock.

Dr. J. L. NEWTON—Two examples of *Thanasimus rufipes* (Brahm) (Col., Cleridae) from Aviemore, Inv., June 1970, with for comparison, *T. formicarius* (L.).

Mr. J. A. C. GREENWOOD—Illustrations of butterflies used in continental advertising.

Mr. P. L. COOK—*Leptura sexguttata* F. (Col., Cerambycidae) taken in the New Forest, Hants, 20.vi.70, including a black aberration taken on bramble blossom.

COMMUNICATIONS

Mr. B. GOATER said that during Whitsun he had obtained pupae of *Amathes alpicola* Zett. (Lep., Noctuidae) at Aviemore, Inv. One female had emerged deformed and had been kept live in a box. Later a male had partially emerged from the pupal case and had to be helped out of the discarded skin. This was also deformed, and was placed in the same box as the female. They subsequently paired and the female eventually laid about 200 ova. The first instar larvae had now emerged and were feeding on birch.

Apatura iris L. (Lep., Nymphalidae) was reported to be on the wing in west Sussex by Dr. A. H. B. RYDON, it had been in flight for several days. A lot of *Limenitis camilla* L. (Lep., Nymphalidae) were on the wing with them, but were worn. He thought that the *L. camilla* acted as a form of protection for the *A. iris* inasmuch as though the species was larger and the male noticeably so, the female was much closer in appearance.

Commenting on Mr. Bretherton's *Lycaena dispar* Haw. ssp. *batavus* Oberth., Mr. T. G. HOWARTH said that he had recently seen the type series of the San Quentin race, and these were probably larger than ours. Mr. Bretherton then said the area in which the San Quentin race had been found was now colonised by a smaller race, and contrary to other races of the species appeared to feed on almost any dock. Also this race is double brooded and the second brood is noticeably smaller than the first.

Thanasimus formicarius (L.), which as Dr. Newton had said, is usually associated with conifers, does on occasions, said Mr. F. D. BUCK, occur in numbers on deciduous trees. Such was the case in Epping Forest where the species occurred plentifully on an elm on Fairmead, where it was preying on *Scolytus scolytus* (F.) (Col., Scolytidae). Mr. P. L. COOK added that he had taken the insect on oak in the New Forest.

With reference to Col. Emmet's *Laspeyresia leguminana* Zell., Mr. E. S. BRADFORD asked if the moth did in fact cause the burr on the tree or did it just take advantage of the situation. Col. Emmet thought the burrs much too large to be caused by the insect; but Mr. P. A. GODDARD said we should not rule out the possibility of the insect being the prime cause. It could be responsible for a hormonal change which could produce a chain reaction.

A series of coloured slides of Hübner's illustrations were shown by Mr. T. G. HOWARTH, showing how confusing the two species *Colias hyale* L. and *C. australis* Verity (Lep., Pieridae) can be. He made the point that Hübner confused *C. hyale* with the then unknown *C. australis*. It was Hübner's figures from which those for South were taken.

23rd JULY 1970

The President, Dr. B. J. MACNULTY, in the Chair.

EXHIBITS

Mr. C. O. HAMMOND—Queens of *Vespa austriaca* (Panz.) (Hym., Vespidae), the Cuckoo or Wood Wasp, taken at the curling pond, Grantown-on-Spey, Moray., 7–10.vii.70. This rare wasp is an inquiline in nests of *Vespa rufa* (L.), the Red Wasp, which it closely resembles.

Mr. T. J. G. HOMER—(1) An example of *Heliothis nubigera* H.-S. (Lep., Noctuidae) which flew into the smoking room of a vessel s.s.w. of the Canary Islands and about 100 miles west of Cape Blanco, in the N.E. Trade Wind Belt. (2) A large hemipteron, believed to be an 'assassin bug' from Santos, Brazil, which had prominent spade-like projections on the tibia which gleam in the brilliant sunshine.

Mr. A. E. STUBBS—(1) *Vidalia cornuta* (Scop.) (Dipt., Trypetidae), an exotic-looking species which in the male bears a pair of horn-like processes on the front of the head, which also bears dorsal spines. It is a leaf-miner of *Eupatorium cannabinum* L. (Hemp Agrimony). The male exhibited was taken at Leckford, N. Hants, 25.v.70. (2) *Tenthredo scrophulariae* L. (Hym., Tenthredinidae), a handsome wasp-like sawfly which is local in southern England. It was taken on its foodplant, *Scrophularia nodosa* L. (Figwort), at Leckford, 25.v.70.

Col. A. M. EMMET—A mine of what is believed to be *Scoliaula quadrimaculella* Boh. (Lep., Nepticulidae) in the petiole of a leaf of *Athus glutinosa* (L.) Gaertn. (Alder). The mine was taken at Chippenham Fen, Cambs., 22.vii.70.

Mr. D. STIMPSON—A *Dysdera* spider, possibly *crocata* C. L. Koch, female taken by Mrs. T. G. Howarth, at Beer, Devon, 12.vii.70. The species feeds almost exclusively on woodlice.

COMMUNICATIONS

Commenting on microlepidoptera, Col. A. M. EMMET said that *Stathmopoda pedella* L. (Lep., Heliodinidae) was still in Chippenham Fen. Working in the fen the previous day (22nd) he had taken a number of small *Leucoptera* (Lep., Lyonetiidae) which he thought might be *L. orobi* Staint., but the colour of the hindwings did not appear to be correct. There are a few species, very difficult to differentiate, to which these specimens might belong, but none of the recorded food-plants for any of them was present.

In Ireland at the end of June, said Dr. C. G. M. DE WORMS, he had taken

Perizoma taeniata Steph. (Lep., Geometridae) at Killarney, and had seen a number of dark *Mesoacidalia charlotta* Haw. (Lep., Nymphalidae) in the Burren, Co. Clare.

In Britain, he said, it had been a good year for *Limenitis camilla* L. *Argynnis paphia* L. and *Apatura iris* L. (Nymphalidae,) whilst in certain parts of the country *Colias croceus* Fourc. (Pieridae) was on the wing in numbers. He had noted *Celastrina argiolus* L. (Lycaenidae) in fair numbers in East Anglia, where he had recorded over 100 species of Lepidoptera at mercury vapour light in one night, having *Cossus cossus* L. and *Zeuzera pyrina* L. (Cossidae) on the sheet at the same time.

In his mercury vapour light trap at Southwold, Suffolk, Dr. de Worms said he had obtained several *Hadena compta* Schiff. (Noctuidae), and he reported *Strymonidia w-album* Knoch (Lycaenidae) to be more plentiful this year, its localities included such places as Whippendell Wood, Herts.

Capt. J. ELLERTON reported *Hadena compta* Schiff. from Bucks., whilst *Celastrina argiolus* L. was recorded from Wood Green, N. London, by Mr. C. O. HAMMOND; the west of Ireland by Col. Emmet; Colchester, Essex, by F. D. BUCK; and Aviemore, Inv., by Dr. B. J. MACNULTY.

At Lamarsk, N. Essex, Mr. Buck reported a mercury vapour light in use for only a couple of hours on 18.vii.70 attracting 50 species of Lepidoptera. He added that on the same evening *Lampyris noctiluca* (L.) (Col., Lampyridae) was discovered in an adjacent field in some numbers. One was caught, and on examination proved to be a pair *in cop*. Even in the light of the mercury vapour lamp they continued to glow brilliantly and only ceased when they eventually parted.

An enquiry regarding the status of *Maculinea arion* L. (Lep., Lycaenidae) prompted Mr. T. G. Howarth to report a few seen.

A discussion on 'Collecting or Conservation' was opened by Dr. MacNulty, who first said he did not like the title of the discussion; it implied one or the other, whereas without collecting we would be ignorant of what to conserve. He believed it to be a very rare case when collecting alone threatened the existence of a species. In his opinion the main trouble was earth-moving equipment and insecticides. With this last remark Mr. E. S. BRADFORD agreed.

Mr. F. D. BUCK said that collecting was valid if proper recording accompanied it. In the past entomologists had failed inasmuch as recording had been slack. We still had to lose the stigma acquired long ago when overcollecting for sale was rife. He also believed we should conserve by habitat, covering as wide a field as possible.

Collectors must, in the opinion of Mr. R. F. BRETHERTON, give much more thought to what they take, and how many examples. It should be the positive aspect that should be preached and publicised. Many insects are now in small and restricted localities, populations of which can be badly damaged by careless and thoughtless collecting.

Collecting, he continued, has a bad name due to a false parallel with past practices and earlier activities among ornithologists in particular. He was quite convinced that collecting was absolutely necessary, but with proper care and attention to the situation.

Mr. P. A. GODDARD said we do not help ourselves to acquire a good image if we collect in ways that do not further the aims of conservation. Light traps were such a means and spoiled the state of the insects caught in them; it was better to collect in the actual habitat, or rear the insects. The onus lay, in his

opinion, on the entomologist to do nothing that he does not know will do no harm to the status of an insect. Light traps he thought, did nothing in the cause of conservation, and he deplored the use of them.

In reply, Mr. Bretherton asked what damage was done by light traps, and what evidence there was of such damage. He had operated a light trap in one area over a prolonged period and allowing for fluctuating populations could detect no decline in numbers.

Taking a mercury vapour light to an area being worked, said Mr. Buck, was an effective way of sampling the area for these species which are attracted to light. It had to be used properly and sensibly in conjunction with other means of collecting, but did provide the entomologist with a valuable tool. Mr. Bretherton added that this method of collecting had provided considerable distribution knowledge; and Mr. T. J. G. HOMER, in support, cited the case of *Stauropus fagi* L. (Notodontidae) and pointed out that much can be missed without the use of a mercury vapour light.

Our President said that before the use of mercury vapour light the same few spots were visited for individual species, but now a wider distribution was proved, a wider choice of localities was available producing less concentrated collecting. He added that many people who objected so strongly to collecting used flytraps and sprays in their homes and gardens without restraint.

Conservation of areas was the theme of Mr. D. STIMPSON and Dr. MacNulty said that many of our nature reserves are amongst the worst pieces of countryside.

There are, said Mr. A. E. STUBBS, some 20,000 species of insects in this country, and we can take specific measures to conserve only a few. There is indeed little if any threat to most of them, providing suitable habitats are available. He agreed that many of our reserves are poor countryside entomologically, since they were chosen on the other criteria, and even a current review by the Nature Conservancy has little entomological data to hand. He continued by saying that we were providing very little information to help those involved in conservation; advice on localities and management is what is required.

Mr. S. N. A. JACOBS observed that good intentions were not good enough, and that it was useless to reserve an area only to turn it into a glorified car park and have it trampled underfoot.

Blean Woods was a locality quoted by Dr. MacNulty, once famous for many species, which had become a spot where one might pick up the odd example of species which were once there in numbers. Under pressure from the late Dr. A. M. Massee the wood had been coppiced as it was in the old days, and once more the specialities increased in numbers.

Mr. Buck said it was not good enough just to conserve countryside, we had to attempt to conserve something tangible. This in turn would mean proper management, continual, and probably on a rotational basis; and, in some cases, wardening. All this means time and money, neither seemingly readily forthcoming from naturalists generally in the quantity necessary. Mr. Stubbs pointed out that there was a conservation corps and added that 'public open space management' was quite anti-conservation.

A concern was expressed by Mr. W. PARKER about the way reserves arbitrarily prohibited collecting. As reserves became more numerous and the collecting areas dwindled collecting would appear to become restricted to the favoured few, and in this way difficulties would be placed in the way of the field worker.

Experience of the way this problem was tackled abroad was given by Dr. C. G. M. de Worms, who said that in several European countries very large areas,

sometimes hundreds of square miles, were designated national parks, and in them collecting was rigidly prohibited without a special permit.

Mr. Buck said he could see nothing wrong with the present collecting restrictions in our reserves. Genuine field workers were seldom refused a permit, but it was usually obligatory for the permit holder to submit details of material recorded to the reserve authority. In his opinion a not unreasonable proviso. In short the collector had to have a purpose and finally supply some results of his work.

A critical point on which we must all come to terms, said Mr. Stubbs, is that if we agree with the necessity for conservation, we must help the conservationist. Mr. Homer added that he had experienced nothing but co-operation in obtaining permits.

Earth movers were not, Mr. G. PRIOR thought, the prime villains, they were merely preparing the way for development which would take place with or without their use. The greatest menace was trampling people, they did a vast amount of damage to wild life. He believed many of our reserves were reserves because nobody really wanted to use the land for any other purpose. He was concerned about the management factor and believed it would be seen in terms of parks and gardens only.

Mr. T. G. Howarth regretted that the needs of entomologists are scarcely catered for by Nature Conservancy and he thought they should attempt to obtain reserves in areas where the entomologists had indicated threatened species. There was, he believed, a great deal of public sentimentality about birds and a complete indifference, if not loathing, about insects.

Referring to the management of reserves, he said Blean Woods was probably the only reserve set up specifically for a butterfly; but it required the initiative and drive of the late Dr. Massee to get management started in a proper manner to ensure the objective was secured.

He quoted a case where *Maculinea arion* L. was lost in a locality because of the failure to manage a private reserve.

Mr. Homer drew attention to Gussets Wood, Bucks., with a high lepidopterous population, covering many species. He believes the wood is so rich in this respect because of a glade, cut by the Electricity Authority for pylons, right through the wood, permitting the growth of fringe flora allied with beech woods. It was an instance of accidental management, but if the glade were to disappear, he was sure the numbers of lepidopterous species would be reduced.

10th SEPTEMBER 1970

The President, Dr. B. J. MACNULTY, in the Chair.

EXHIBITS

Col. A. M. EMMET—The following microlepidoptera from East Wretham, Norfolk: *Falseuncaria degreyana* McLach. and *Cochlidia erigerana* Wals. (Phaloniidae), and *Coleophora tricolor* Wals. (Coleophoridae).

Mr. M. R. GIBSON—Lepidoptera from Ireland as follows. New county records: *Comacla senex* Hübn. (Arctiidae) from Knockbay marshes, Waterford, 4.viii.70, one was taken at dusk flying above the marsh and another an hour later sitting on a rush top; *Procris stictica* L. (Zygaenidae) from Ballysteige Burrows, Kilmore Quay, Wexford, 11.vii.70, in flight by day; *Cosymbia linearia* Hübn. (Geometridae) from Cappoquin, Waterford, 17.vii.70, beaten from beech; *Euphyia*

unangulata Haw. (Geometridae) from Ballyduff, Waterford, 30.vii.70 and Cappoquin, Waterford, 16-17.vii.70, at tilley light. Other interesting records: *Eumenis semele* L. (Satyridae) from Inch, Kerry, three brightly marked examples, 23.vii.70; *Lycaena phlaeas* L. (Lycaenidae) from Ballyduff, Waterford, an example with the left forewing albinistic, 30.vii.70; *Zygaena filipendulae* L. (Zygaenidae) from Inch, Kerry, two examples with one pair of spots confluent, two examples with two pairs of spots confluent, and two examples confluent to a greater degree, 23.vii.70; *Celaena haworthii* Curt. (Noctuidae) from Knockbay marshes, Waterford all at tilley light, 4.viii.70; *Plusia bractea* Schiff. (Noctuidae) from Kilmacthomas, Waterford, two examples at tilley light, 13.vii.70; *Chloroclystis debiliata* Hübn. (Geometridae) from Cappoquin, Waterford, two examples beaten from Bilberry, 16.vii.70; and *Alcis repandata* L. ab. *conversaria* Hübn. (Geometridae) from Cappoquin, Waterford, a single example at tilley light, 17.vii.70.

Mr. N. TUROK—*Procræter tibialis* (Lac.) (Col., Elateridae) an example found in a rotting tree near Brookman's Park, Herts.

COMMUNICATIONS

Comdr. W. L. R. E. GILCHRIST reported that the Hampshire County Trust has acquired the Basingstoke canal and they would be pleased to receive suggestions regarding treatment and management.

Referring to his exhibit of *Coccinella divaricata* Ol. (Col., Coccinellidae) at the meeting on 25th June this year (see p. 1), Mr. F. D. BUCK said he had received a communication from Mr. G. Pyman saying that now he could recognise this insect he had seen it at mercury vapour light in the Little Baddow district of Essex. At the same time Mr. Pyman had said that *Lampyris noctiluca* L. (Col., Lampyridae) was becoming very numerous in the area.

A talk 'Photographing Animals in Zoos and Elsewhere' was given by Mr. M. SHAFFER, which he illustrated with coloured transparencies.

24th SEPTEMBER 1970

The President, Dr. B. J. MACNULTY, in the Chair.

The death was announced of Mr. Trevor Trought.

The following new members were declared elected: the Rev. Canon C. E. Wigg, and Messrs. J. D'Arcy, M. J. Hoare, E. F. G. McLean and T. Myall.

EXHIBITS

Mr. C. O. HAMMOND—A male *Sympetrum flaveolum* (L.) (Od., Libellulidae), a migrant dragonfly which, on arrival, favours rushy ponds. This example was taken at Ockley Common, Surrey, 17.viii.70, when many others were present.

Dr. B. J. MACNULTY—A series of *Aradus betulae* (L.) (Hem., Aradidae) bred from last instar nymphs taken at Glen Affric, Inv., in June 1970. This species has been taken in the British Isles only once previously by Mr. P. Harwood at Rannoch, Perth, in July 1921.

Mr. B. GOATER—Three very rare aberrations of *Agrotis exclamationis* L. (Lep., Noctuidae). (1) Bilateral gynandromorph, right side female, Bushey, Herts., June 1970. (2) The ab. *virgata* Lempke, Bishops Waltham, Hants, 1943, taken by the late Capt. R. A. Jackson. (3) An aberration with all stigmata absent from Catisfield, near Fareham, Hants, 1965, taken by Mr. R. J. Dickson.

*

Col. A. M. EMMET—(1) Young larvae of *Coleophora tricolor* Wals. (Lep., Coleophoridae) in seedheads of *Acinos arvensis* (Lam.) Dandy (Basil-thyme). The life-history of the larvae after hibernation is not known; they probably feed on grasses. (2) Larvae of *Coleophora clypeiferella* Hofsm., feeding on the seeds of *Atriplex*. The larva constructs a case out of a hollowed seedhead, and is extremely difficult to see. When full-fed it leaves the case and pupates in the ground. (3) A young larval case, believed to be of *Coleophora laripennella* Zett., taken on *Atriplex* plants where adults of this species were plentiful in July. As far as is known, *C. laripennella* has not yet been reared in this country. All the exhibited larvae originated from the Breck district.

Mr. F. D. BUCK—A sprig of holly with prickles extending onto the centre of the leaf, from Copford, Essex, about which he requested information. Mr. B. GOATER said it was *Ilex ferox*, a cultivated species.

COMMUNICATIONS

Commenting on recent Lepidoptera, Dr. C. G. M. DE WORMS said that at Hope Cove near Salcombe, S. Devon, the previous week-end (19th and 20th September) butterflies had been numerous. There had been a lot of fresh *Pieris napi* L. (Pieridae), *Vanessa atalanta* L., *V. cardui* L. (Nymphalidae), *Pararge aegeria* L. (Satyridae) and a late *Celastrina argiolus* L. (Lycaenidae) observed. There had also been an unexpected invasion of *Plusia gamma* L. (Noctuidae); he added that Mr. C. W. Mackworth-Praed had recorded this species in numbers in the New Forest, Hants, on the same night. He also recorded *Antitype xanthomista* Hübn. and *Leucania l-album* L. (Noctuidae). At Slapton, S. Devon, he said a female *Herse convolvuli* L. (Sphingidae) had been taken, and the previous night *Eupithecia phoeniceata* Ramb. (Geometridae) had occurred.

A paper was read by Mr. K. M. HARRIS on 'The Biology of Gall Midges' which he illustrated with coloured transparencies, and which was followed by a discussion.

8th OCTOBER 1970

The President, Dr. B. J. MACNULTY, in the Chair

EXHIBITS

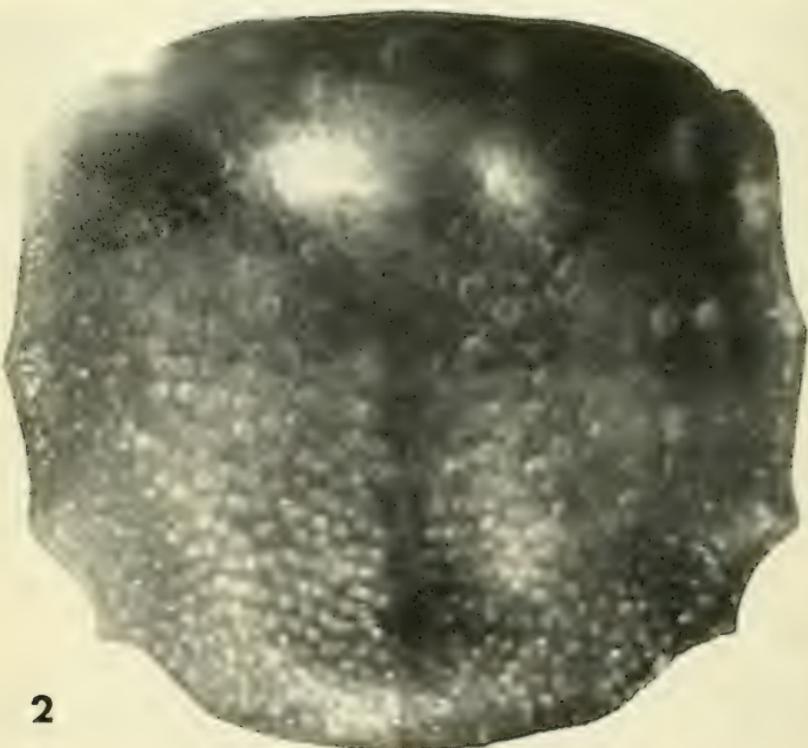
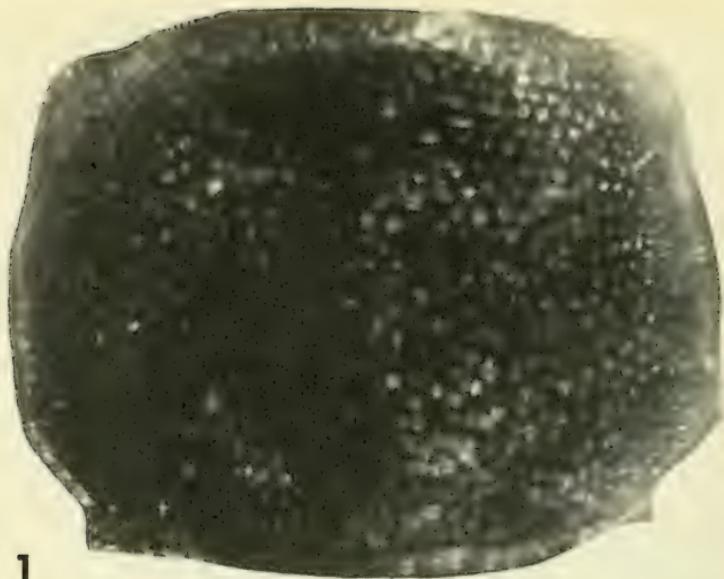
Mr. S. N. A. JACOBS—Mines, unfortunately empty, of *Nepticula spinosella* de Joannis (Lep., Nepticulidae) from Box Hill, Surrey. This species was added to the British list earlier this year by Col. A. M. Emmet.

COMMUNICATIONS

The PRESIDENT announced the award of £100 from the Hering Memorial Research Fund to Herr Hugo Andersson of Sweden to assist his research into African and Indian Diptera of the family Chloropidae.

Dr. C. G. M. DE WORMS said that Mr. D. flennel had taken in his light trap near Winchester, Hants, the following Lepidoptera: a single example of *Catocala fraxini* L. (Noctuidae), two *Herse convolvuli* L. (Sphingidae), a *Heliothis armigera* Hübn. (Noctuidae), and, on 28.ix.70, some 200 *Agrotis ipsilon* Hufn. (Noctuidae).

Referring to the last mentioned species Mr. R. F. BRETHERTON said he had taken 33 examples in his trap at Bramley, Surrey in one night, but he had found *Plusia gamma* L. (Noctuidae) to be scarce.



1. Pronotum of *Pediacus dermestoides* (F.)
2. Pronotum of *Pediacus depressus* (Herbst)

A colour film 'Origin of the Hawaian Islands', supplied by Dr. E. C. Zimmerman, was shown.

22nd OCTOBER 1970

The President, Dr. B. J. MACNULTY, in the Chair

The following new members were declared elected: Dr. P. A. Boswell and Messrs. P. E. Cook, C. E. Dyte, C. Edwards, A. G. Lawson, M. J. Mowbray, T. Wilkinson, and M. Shaw.

EXHIBITS

The PRESIDENT—Referring to his exhibit of 23rd April (see Vol. 3, p. 94) and Mr. A. E. Gardner's caution under Communications for the same date; Dr. MacNulty said he had re-checked the identification of the specimens against the key and description in *Die Käfer Mitteleuropa*, 7:95–6 (1967), and also against Mr. A. A. Allen's recent publication (1956, *Ent. mon. Mag.*, 92:212). Allen used the sculpture of the elytra and the shape of the latero-basal angle as distinguishing features. That of *Pediacus depressus* (Herbst) (Col., Cucujidae) has a definite thorn-like prominence (Pl. I, fig. 2), whereas in *P. dermestoides* (F.) this projection is reduced to a sharp beak (Pl. I, fig. 1) and may be even further reduced to a sinuosity immediately prior to the latero-basal angle. According to Allen, *P. depressus* is punctate on the elytra with traces of striae and is almost shining, whereas *P. dermestoides* is quite matt and the elytra are practically impunctate. Dr. MacNulty, however, thought that the elytral sculpture was not very reliable and varied greatly from specimen to specimen. In any case it was difficult to see. Under high magnification there appeared to be puncturation in both species and although it was more marked in *P. depressus* it seemed doubtful if this is of much help in separating the species. The degree of shininess depends very much on the type and angle of the lighting and raises doubts rather than aids identification.

Finally the prothorax is *P. depressus* (*Die Käfer Mitteleuropa*) is quadrate (Pl. I, fig. 2) whereas in *P. dermestoides* it is obviously transverse (Pl. I, fig. 1). In addition Dr. MacNulty said he felt that the basal portions of the lateral margin in *P. dermestoides* was less concave than in *P. depressus* and that the whole thoracic outline was smoother.

He reported that in June he had taken further *dermestoides* in the New Forest, Hants., on recently cut beech. He suggested that neither was restricted to pine but would occur on any wood in a suitable state. Pine was more often found in cut condition nowadays than other trees since felling was rarely replanted.

He believed these observations confirmed the identification and the new county record for *P. depressus* in Suffolk.

Mr. A. E. GARDNER—A series of *Axinotarsus marginalis* Lak. (Col., Mala-chiidae) from Bere Forest, S. Hants., 12.vii.70.

COMMUNICATIONS

A letter was read from Dr. P. J. Roche, asking for volunteers to receive and identify material, particularly Diptera and Hymenoptera, from the Seychelles.

As Dr. C. G. M. de Worms was prevented by illness from giving his talk on 'South and East Africa Revisited', Mr. R. F. BRETHERTON showed coloured slides of field meetings and of larvae and adults of various British Lepidoptera.

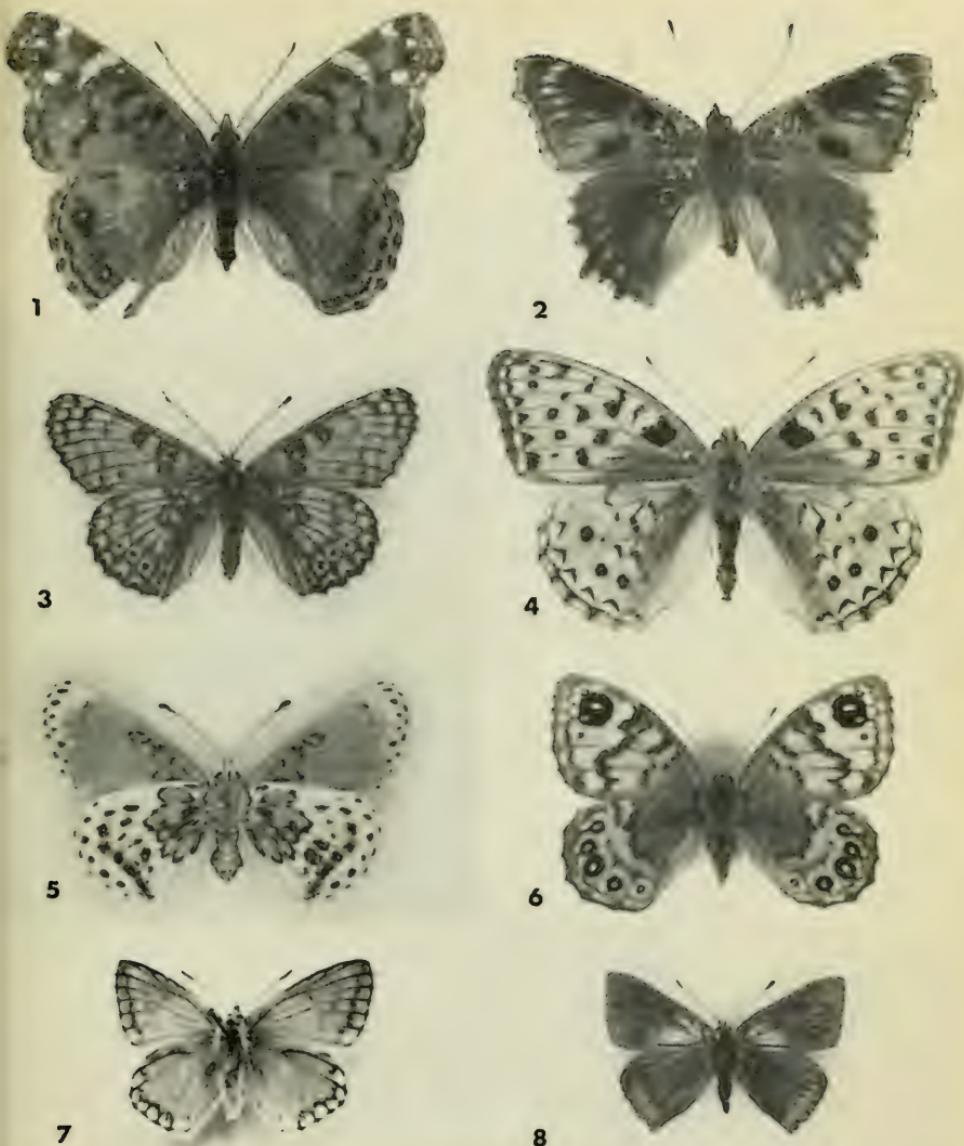
ANNUAL EXHIBITION

7th November 1970

The Annual Exhibition was held in the Conversazione Room of the British Museum (Nat. Hist.). There were between 85 and 90 exhibitors, of whom over 70 included Lepidoptera in their exhibits; but a few others showed the possibilities of displays of other Orders. The large attendance raised the temperature of the room to almost tropical level during the afternoon.

Among the macrolepidoptera, the most striking feature was the large number and high quality of the aberrations of British Rhopalocera, headed by the Society's own exhibit, arranged by the Curator, of two drawers of *Lysandra coridon* Poda from the Bright Collection. Outstanding aberrations taken in the field were *Lycaena phlaeas* L. ab. *bervinensis* Smith (Capt. A. P. GAINSFORD) (Pl. II, fig. 8), a bilateral gynandromorph of *Erebia aethiops* Esp. and a *Pieris rapae* L., (Pl. III, fig. 9), with the underside heavily suffused with black (A. D. A. RUSSWURM and G. M. MIDDLETON), an extreme *Lysandra bellargus* Rott., ab. *obsoleta* Tutt, a *Polyommatus icarus* Rott. female with straw-coloured lunules (R. M. CRASKE), and a *Leptidea sinapis* L. ab. *ganarew* Frohawk (K. N. BASKCOMB). Good forms of *Aphantopus hyperantus* L. were also shown (Rev. J. N. MARCON, R. F. BRETHERTON and M. LEECH). R. B. and R. W. WATSON, and also R. C. REVELS and P. W. CRIBB, showed fine selections, mostly bred, of aberrations of several species; and R. M. TUBBS four generations of *Lysandra coridon* Poda ab. *syngrapha* Kefer, and a bred *Apatura iris* L. approaching ab. *lutescens* Schultz. Caught aberrations of *Anthocharis cardamines* L., *Pararge aegeria* L., *Coenonympha pamphilus* L. and *Lysandra coridon* Poda were exhibited by B. W. WEDDELL on behalf of Maj.-Gen. C. G. LIPSCOMB, and of *Vanessa atalanta* L. and *Lycaena phlaeas* by N. A. RICHARDSON. Commdr. G. W. HARPER showed a fine example of *Aglais urticae* L. ab. *nigra* Tutt (Pl. II, fig. 2); Mr. A. D. A. RUSSWURM and Mr. H. G. M. MIDDLETON exhibited the *Fabriciana cydippe* L. on plate II, fig. 4, among several other aberrations of the same species, and Mr. Middleton also showed an interesting *Melitaea cinxia* L. (Pl. II, fig. 3) from Brading, I.o.W. Another *M. cinxia* L. with a pattern similar to the aberration *cos* Frohawk of *M. athalia* Rott. (Pl. II, fig. 5) was bred by Mr. P. W. CRIBB from I.o.W. stock. Amongst some insects from the collection of Mr. F. Johnson shown by R. B. and R. W. WATSON was a female example of *Pararge megera* L. with all spots enlarged and lanceolate (Pl. II, fig. 6). For Major-Gen. C. G. LIPSCOMB and Mr. B. L. WEDDELL showed a *Lysandra coridon* Poda ab. *ultrafowlerimargino* B. & L. (Pl. II, fig. 7). A *Maniola tithonus* L. female (Pl. III, fig. 10) figured in the exhibit of Mr. B. G. WITHERS.

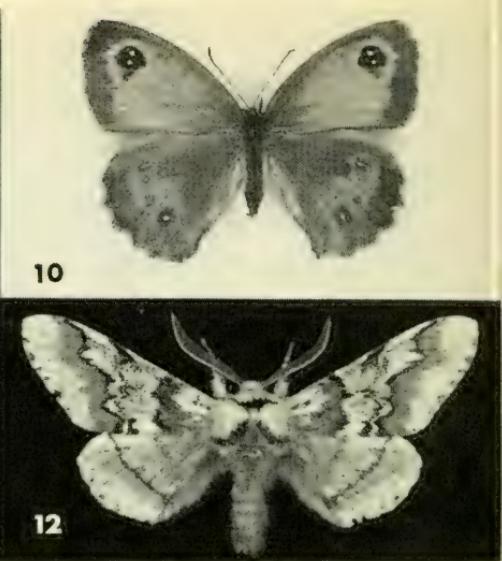
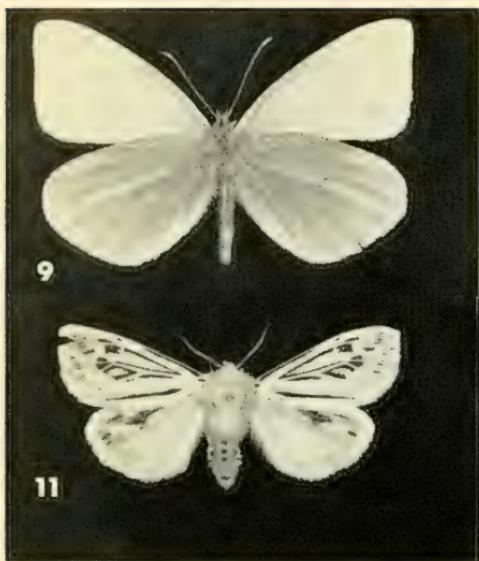
Aberrations of Heterocera were also prominent; a possibly unique black form of *Plusia gamma* L. (Pl. III, fig. 13) and a *Spilosoma lubricipeda* L. with a dusky tornus (B. W. WEDDELL on behalf of D. BROTHERIDGE) and another (Pl. III, fig. 11) streaked form approaching ab. *walkeri* Curt. was shown by Mr. H. E. CHIPPERFIELD, *Ellopia fasciaria* L. ab. *prasinaria* Schiff. (Rev. D. J. L. AGASSIZ), an albinistic *Biston strataria* Hufn. (I. A. WATKINSON) (Pl. III, fig. 12), a yellow *Arctia caja* L. (H. E. CHIPPERFIELD), a uniformly brown *Cephis advenaria* Hübn. (B. SKINNER), a biscuit-coloured *Discestra trifolii* Hufn. (R. F. BRETHERTON). Unusual forms of *Colotois pennaria* L. were shown by J. A. C. GREENWOOD (Pl. III, fig. 15) and by Dr. H. B. D. KETTLEWELL, who also contributed one of the several fine forms of *Panaxia dominula* L. exhibited. Ranges of variation were shown by many exhibitors, one of the most striking being a series of *Mimas*



(Photograph by Mr. D. J. Carter)

ANNUAL EXHIBITION, 7th November 1970

1. *Vanessa virginensis* Drury, A. P. Gainsford; 2. *Aglais urticae* L. ab. *nigra* Tutt, G. W. Harper; 3. *Melitaea cinxia* L., H. G. M. Middleton; 4. *Fabriciana cydippe* L., H. G. M. Middleton; 5. *Melitaea cinxia* L. (underside), P. W. Cribb; 6. *Pararge megera* L., R. W. Watson; 7. *Lysandra coridon* Poda ab. *ultrafowlerimargino* B. & L., B. L. Weddell; 8. *Lycaena phlaeas* L., A. P. Gainsford.



13



14



15



16

(Photograph by Mr. D. J. Carter)

ANNUAL EXHIBITION, 7th November 1970

9. *Pieris rapae* L. (underside), A. D. A. Russwurm; 10. *Maniola tithonus* L. (female), B. G. Withers; 11. *Spilosoma lubricipeda* L., H. E. Chipperfield; 12. *Biston strataria* Hufn., I. A. Watkinson; 13. *Plusia gamma* L., D. Brotheridge; 14. *Agrotis exclamationis* (halved gynandromorph), B. Goater; 15. *Colotois pennaria* L., J. A. C. Greenwood; 16. *Phyllonorycter dubitella* H.-S., D. J. L. Agassiz.

tiliae L. from Kent (B. K. WEST). Gynandromorphs were represented by a magnificent *Agrotis exclamatornis* L. (B. GOATER) (Pl. III, fig. 14), who also showed five *Catocala fraxini* L. ab. *maerens* Fuchs from among 22 adults which he had bred from eggs laid by a female taken in Shetland in 1969.

Rare immigrants were fewer than last year, reflecting a poor season for them in 1970, though the display was reinforced by a few of the late captures in 1969, which included a *Uresiphita polygonalis* Schiff. from Monmouthshire, 13.x.69 (G. A. N. HORTON), *Palpita unionalis* Hübn. from Beetham, Lancs, and *Plusia orichalcea* F., *Heliothis armigera* Hübn., *Cosymbia pupillaria* Hübn., *Palpita unionalis* Hübn., *Diasemina ramburialis* Dup., all from Slapton, South Devon, September 1969 (G. A. COLE). Among the arrivals in 1970, the best were an *Eromene ocelleus* Haw. trapped at Bursledon, Hants, in January (I. A. WATKINSON) and a spectacular female *Vanessa virginensis* Drury (*huntera* F.) (Pl. II, fig. 1), caught on buddleia at Yelverton, Devon, 18.ix.70 (Capt. A. P. GAINSFORD). There was one *Plusia ni* Hübn., caught in Dorset in August (B. G. WITHERS), one *Acherontia atropos* L., Slapton, Devon, 9/10.ix.70 (G. A. COLE), two *Heliothis armigera* Hübn., from Martyr Worthy, Hants, 28.ix.70 (D. FFENNELL) and from Newtonmore, Inverness-shire, possibly the northernmost British record (G. W. HARPER), and a few *Herse convolvuli* L. and *Rhodometra sacraria* L. from Cornwall, Devon, Hants and Kent in September and October (J. A. C. GREENWOOD, G. A. COLE, L. W. SIGGS, R. HAYWARD, T. W. HARMAN). A pale *Eurois occulta* L. from Clay Cross, Derbyshire, 30.viii.70 (J. CULPIN) was probably a migrant from Scandinavia; and it may be suspected that the single examples of *Eustrotia bankiana* F. (*olivana* Schiff.) exhibited from Walberswick, Suffolk (H. E. CHIPPERFIELD) and Kent (S. COXEY) were also immigrants. Several of the exhibitors noted that their immigrants were caught during gale-force winds.

Several members showed selected series of species from particular areas, such as Monmouthshire (G. A. E. NORTON), the West Midlands (L. J. EVANS), Shetland and Orkney (A. RICHARDSON), North Hampshire (Cmdr. W. GILCHRIST), Awbridge, Hants (S. A. KNILL-JONES), Ireland (C. G. M. DE WORMS). Some of the moths were noted as probably new county records, such as *Dasylophia templi* Thunb., Pyrford, Surrey, 29.x.70 (J. A. C. GREENWOOD), *Thera juniperata* L. for Gloucestershire (A. RICHARDSON); or as occurring in surprising surroundings, such as *Hadena bombycina* Hufn. on the sea-shore at Looe in Cornwall (R. C. DYSON) and *Oria musculosa* Hübn. in the New Forest, Hants (L. W. SIGGS). Other members exhibited particular species or groups. Particularly interesting were the comparative series of *Erebia aethiops* Esp. from the two remaining English localities (C. R. HAXBY), the bred series and photographs of the earlier stages of *Amphipyra pyramidea* L. and *A. berbera* Rungs (G. M. HAGGETT), and the life-histories of *Sesia apiformis* Clerck and *Sphecia bembeciformis* Hübn. (B. R. BAKER). An unusual breeding was that of *Aegeria muscaeformis* Esp. (J. V. BANNER). The superiority for the cabinet of bred specimens stood out from the series shown by D. O'KEEFE and R. G. CHATELAIN. Too many of the exhibitors of the results of general collecting during the season still fail to indicate clearly why what they show is interesting, either to themselves or the public.

Continental and exotic Lepidoptera, especially Rhopalocera, were well represented, both by general displays and by some species of special interest. Among the latter was a striking long-tailed male of the silk-moth *Antistathmoptera daltonae* Tams, taken in the East Usambara mountains of Tanzania early in 1970, believed to be only the third specimen ever taken (Dr. A. A. MYERS); also photographs of a new African saturniid, *Argema kuhnei* Pinhey, from Zambia,

and a *Morpho rhetenor* of an unusual form from Guyana (L. W. BURGESS). The more general exhibits from Europe included selections, mostly of butterflies, from Portugal (J. A. C. GREENWOOD), Spain, France and Switzerland (Maj.-Gen. Sir GEORGE JOHNSON), Spain (P. W. CRIBB), west France (E. N. ARCHER), south of France (P. CALDERARA) and Corsica, with excellent maps (M. SHAW), central Italy (C. G. M. DE WORMS), Sicily (L. G. HIGGINS), the Black Forest in Germany (J. and G. MANSELL), Tirol, Italy and France (G. A. N. HORTON), and central Greece, with what are probably the first examples recorded for that country, of *Aphantopus hyperantus* L. (R. F. BRETHERTON). Tropical butterflies (T. J. HOMER), and also some from North America (Dr. D. A. DAVIES and J. H. PAYNE).

A disturbing exhibit was that of road casualties picked up by L. H. and P. FARWELL on a two-mile stretch of road in the New Forest on 2.viii.70, consisting of 172 individuals of 14 species of butterflies and nine moths. Perhaps not surprisingly the Grayling (*Eumenis semele* L.), whose habit is to settle on the ground, accounted for nearly a quarter of the total, which nonetheless seems very high. Planning of conservation was illustrated by photographs and maps of the past history and present status of the 'blues', *Maculinea arion* L., *Cupido minimus* Fuessly, *Lysandra coridon* Poda, *L. bellargus* Rott., in Gloucestershire, a survey which is being undertaken by the Gloucestershire Trust for Nature Conservation (J. MUGGLETON). Since the exhibit recorded the probable extinction in the County of the first and last of these species, it may have come too late. The collection of more general information, necessary for conservation as well as for other purposes, was encouraged again this year by the charts and maps showing the progress of the BIOLOGICAL RECORD UNIT's distribution mapping scheme for the British Macrolepidoptera and, most recently, for European Rhopalocera.

Photographs were used to support many exhibits, but photography as an art in itself was illustrated by some fine colour work by G. E. HYDE and by black and white prints by R. C. REVELS. Many members also make coloured slides, but displays of these at the exhibition is difficult. Finally, BRIAN HARGREAVES' exhibit of some of the plates from the recently published *Field Guide to the Butterflies of Britain and Europe* (Collins), and of some of those prepared for the forthcoming book on the British Tortricidae, showed that the older arts of drawing, painting and colour printing can still compete with the camera.

Ten members exhibited cases in which microlepidoptera featured prominently, and several others included a sprinkling of the smaller moths among their macrolepidoptera. There were two species new to the British list and several which had not previously been recorded from their country of origin: viz. eight were new to Ireland, two to Wales and one each new to England and Scotland.

The species new to Scotland was *Scrobipalpa muriella* H.-S., bred from larvae taken in *Antennaria dioica* (L.) Gaertn., on the island of Rhum by E. C. PELHAM-CLINTON. From the same island he showed specimens of *Opsibotys terrealis* Treits. bred from *Solidago* and reared examples of his eponymous *Scrobipalpa* from the neighbouring island of Arran, a new locality for *S. clintoni* Polovný. Inverness-shire was the county of origin of bred examples of a number of interesting species shown by J. M. CHALMERS-HUNT. These included the scarce *Coleophora arctostaphyli* Meder (both set specimens and living larvae), *C. vitisella* Gregs., *C. glitzella* Hofm. and *C. idaeella* Hofm., together with the tortricids *Epinotia nemorivaga* Tengst, *Olethreutes arbutella* L. and *Petrova resinella* L. From Aberdeenshire Mr. PELHAM-CLINTON showed *Catoptria permutterella* H.-S. and a bred specimen of *Depressaria silesiaca* Hein., a species which he added to the British list in 1969.

From Aberdeenshire we once more make a mighty leap this time to Derbyshire, apart from an example of *Palpita unionalis* Hübn. taken in Lancashire by Mr. S. COXEY in 1969. It is indeed unfortunate that the British Entomological Society seems at present to be unable to explore the microlepidoptera of southern Scotland and the north of England. The Derbyshire material was bred by Col. A. M. EMMET and was the result of the Society's field meeting there last May. The most interesting species were *Amelia unitana* Hübn., *Caryocolum viscariellum* Staint., *Coleophora vitisella* Gregs. and *Fomoria weaveri* Staint.

The same member showed a number of scarce species from Norfolk. These included the plume *Crombruggia distans* Zell. and the phaloniids *Cochylidia erigerana* Wals. and *Falseuncaria rubellana* Hübn. (*degreyana* McL.). He also had two specimens of the rare *Coleophora tricolor* Wals., while Mr. CHALMERS-HUNT exhibited living larvae of that species feeding on grass; the early stage of the larva, when it feeds in the seed capsules of *Acinos arvensis* (Lam.) Dandy, has been known for several years, but its switch to grasses, though suspected, had not hitherto been proved.

Suffolk was represented by several species taken at Walberswick by H. E. CHIPPERFIELD. These included *Adoxophyes orana* F.R., its most northerly record to date, and the first specimen of *Ethmia bipunctella* F. to be recorded from Suffolk for over a hundred years. Mr. Chipperfield also showed bred specimens of *Acrolepia assectella* Zell., which is now well established in East Anglia and is a potential pest in leeks and onions; Mr. S. WAKELY had specimens from the same stock. Mr. CHALMERS-HUNT had examples of *Coleophora lari-pennella* Zett and *C. clypeifera* Höfm., rare species which he captured on the same ground near Icklingham. Mr. M. J. LEECH showed a specimen of *Calamotropha paludella* Hübn. taken in the east of the county.

Specimens from north Essex included *Zeiraphera ratzeburgiana* Ratz., *Epinotia cinereana* Haw., *E. nanana* Treits., *Tinea lanella* P. & M. and the pretty little *Nepticula aeneofasciella* H.-S. exhibited by Col. EMMET, while the south of the county supplied his *Eucosma herringiana* Jäckh. and Mr. E. S. BRADFORD'S *Hedya salicella* L.

Cambridgeshire was represented mainly by moths from the fens or bred by Col. EMMET. Specimens of *Agriphila selasella* Hübn. proved that this moth has not, as had been feared, become extinct at Wicken, and a specimen of *Cydia leguminana* Lien. came from the exact spot where Lord Walsingham had first found it just over a century ago. The 'neps' from this locality included both bred and captured specimens of *Stigmella paradoxa* Frey (*nitidella* Hein.), being the first British examples of this new addition to our fauna, the first British-bred specimen of *Dechiria turbidella* Zell. and an example of *D. intimella* Zell. Maddingley was the locality for *D. quinquella* Bed. and Chippenham Fen provided *Stathmopoda pedella* L., *Phyllonorycter geniculella* Rag., *Monopis weaverella* Scott and *Bohemannia quadrimaculella* Boh. Specimens of the last named insect were also present in the exhibit by Mr. Chalmers-Hunt.

Mr. Bradford showed a number of species from Hertfordshire, including *Sitochroa verticalis* L. *Phycita roborella* L., *Euzophera pinquis* Haw., *Olethreutes bifasciana* Haw., *Teleiodes alburnella* Zell., *Coleophora binderella* Koll. and *Lampronia capitella* Clerck; the last species being taken at light, which is unusual. Col. Emmet exhibited *Eustaintonia pincolella* Zell. from Bucks., *Elachista trapeziella* Staint. from Oxfordshire and *Aethes rutilana* Hübn. from Berkshire; the last of these species has become exceedingly rare with the decline of juniper in the south of England, but these examples dispel fears that it has become extinct.

Micros from Middlesex included *Gypsonoma oppressana* Treits., *Epinotia bilunana* Haw., *Teleiodes alburnella* Zell. and *Phyllonorycter geniculella* Rag. shown by Mr. Bradford, a series of *Mompha nodicollella* Fuchs from south London, bred by Col. Emmet, and examples of the same species taken at light by Mr. S. Wakely.

Kent was well represented. The species included bred specimens of *Acrolepia perlepидella* Staint. shown by Mr. Bradford and Col. Emmet, specimens, mostly bred, of *Eucosma aenulana* Schläg. (*laticana* H.-S.), *Hysterosia inopiana* Haw., *Aethes margaritana* Haw. (*dipoltella* Hübn.), *Cochylidia subroseana* Haw., and *Recurvaria leucatella* Clerck (Mr. Bradford); bred specimens of *Leioptilus bowesi* Whal; specimens, all bred, of *Depressaria ultimella* Staint. (from *Sium latifolium* L.), *Elachista adscitella* Staint., *Coleophora fuscocuprella* H. S. (from birch), *C. milvipennis* Zell., *Phyllonorycter anderidae* Flet., *Nepticula obliqueilla* Hein. and *N. assimilella* Zell (Col. Emmet); and a specimen of *Evergestis extimalis* Scop. together with bred *Coleophora orbitella* Zell. (Mr. Chalmers-Hunt).

Surrey provided, among other species, examples bred by Mr. Bradford of *Coleophora palliatella* Zinc., a moth seldom seen in recent years. Mr. Chalmers-Hunt showed the handsome *Commiphila aeneana* Hübn., while he and Col. Emmet both had specimens of *Coleophora wockeella* Zell. which had not previously been bred for over thirty years. The latter also showed specimens of *Nepticula speciosa* Frey and *Etainia decentrella* H.-S. Mr. Wakely's exhibit included specimens of *Eupoecilia ambiguella* Hübn. bred from larvae found at Holmwood.

Mr. R. C. DYSON showed an interesting case of Pyrales from which *Anania funebris* Stroëm., taken in the Eastbourne district, may be selected for mention. Also from Sussex came Col. Emmet's *Cydia internana* Guen., *Leucoptera wailesella* Staint. and a bred series of *Phalonidia alismana* Rag.

Some of the best microlepidoptera in the exhibition were taken in Hampshire. Mr. D. W. H. FFENNELL and the Rev. D. J. L. AGASSIZ showed series of *Phyllonorycter dubitella* H.-S. (Pl. III, fig. 16) bred from *Salix caprea* L. in the Winchester district. This species is new to the British list. Another notable exhibit was the first English specimen of *Coleophora lassella* Staud., previously recorded in Britain only from the Burren. It was taken by the Rev. Agassiz at Southampton. The larval foodplant is still unknown, and when this is discovered the moth may well be found to be more widely distributed in the British Isles. Mr. I. A. WATKINSON showed an example of the rare migrant (or accidentally imported) Pyrale *Euchromius ocellus* Haw. from his home at Burlesdon in the same district. He also had a series of *Phyllonorycter anderidae* Fletcher, bred from mines found six feet up; the species usually favours seedlings a few inches from the ground. Also from Southampton, together with one from south Devon, were The Rev. Agassiz's examples of *Monochroa elongella* Hein. (*servella* sensu Mey.). The same member showed the seldom seen *Parocystola aeroxantha* Mey., taken at Torquay in Devon.

The counties of Herefordshire and Monmouthshire are rich in Lepidoptera and provided several of the rarer species in the exhibition. Mr. Chalmers-Hunt showed the beautiful *Oecophora bractella* L. from the Wye Valley, which was also the locality for Mr. Pelham-Clinton's *Salebriopsis (Postsalebria) albicella* H.-S. and Col. Emmet's *Elachista trapeziella* Staint. Dr. NEIL HORTON exhibited the scarce migrant *Uresiphita polygonalis* Schiff. which he had taken at Usk in October 1969, and Mr. ffennell showed an albino specimen of *Rhopobota unipunctana* Haw. (*naevana* Hübn.) f. *geminana* Steph. from the Black Mountains.

Mr. H. N. MICHAELIS' exhibit from north Wales included two species new to

the Principality. There, both from Caernarvon, were *Cochylidia implicitana* Wocke taken at Bangor by Mrs. M. J. Morgan, and the psychid, *Acanthopsyche atra* L. (*opacella* H. S.), represented by the larval case which Mr. Michaelis himself found at Llyn Bodgynedd. Among his other moths from the same neighbourhood were *Pyrausta cingulata* L., *Epischnia ahemella* Schiff., a soft grey form of *Eana penziana* Thunb. form *colquhouanana* Barr., *Cyndia dorsana* F., and *Teleiodes decorrella* Haw. (*humeralis* Zell.), the last two being not at all uncommon in that district. He showed *Epinotia rubiginosana* H.-S. from Anglesey and Mr. ffennell exhibited *Clepsis rurinana* L. (*semialbana* Guen.) from north Wales.

The west of Ireland again provided its attraction for entomologists and no fewer than eight species new to the country were on show. Three of these were from the Burren, namely *Bucculatrix frangulella* Goeze, shown by Mr. Pelham-Clinton, *Clepsis rurinana* L. shown both by him and Mr. ffennell, and *Stigmella luteella* Staint., bred by Col. Emmet. Other Burren species included bred series showing unusual forms of *Acleris schalleriana* L. (Mr. Pelham-Clinton and Mr. ffennell), an unusually pale *Scoparia ambigualis* Treits. (Mr. Pelham-Clinton) and a bred *Bucculatrix demaryella* Staint. (Col. Emmet).

Amongst some 30 species from West Galway shown by Col. Emmet were five new to Ireland. These were bred *Argyresthia laevigatella* H.-S., and *Heliozela resplendella* Staint. and captured *H. stanneella* Staint., *H. betulae* Staint. and *Stigmella ruficapitella* Haw. This exhibit also included bred examples of *Coleophora tamesis* Waters. and *C. albidella* H.-S., the latter having been hitherto only doubtfully recorded from Ireland. Among his other species from this locality were *Ebulea crocealis* Hübn. (rare in Ireland), *Pammene splendidulana* Guen., *P. argyrana* Hübn., *P. rhediella* Clerck, *Ancylis uncella* Hein. (*uncana* Hübn.), *A. geminana* Don., *A. subarcuana* Dougl. (*inornatana* H.-S.), an unusual pale form of *Mniophaga umbrosella* Zell., *Elachista subalbidella* Schläg., *Coleophora murinipennella* Dup., *Parornix scotinella* Staint., *Caloptilia populetorum* Zell., *Phylloporia bistrigella* Haw. and *Stigmella aucupariae* Frey., most of which constitute new records for the vice-county.

An interesting specialised exhibit, furnished by Mr. R. FAIRCLOUGH, comprised a number of different forms of *Acleris cristana* Schiff. bred from females taken in Huntingdonshire, Surrey and Sussex. The rarest forms shown were *xanthovittana* Desv., *fulvopunctana* Sheldon and *attaliana* Clark and there were, besides, several aberrations which have not yet been described.

Mr. S. N. A. JACOBS showed drawings of the mines of three new or little-known Stigmellidae; these were *Dechtria spinosella* Joan., *Nepticula ulmariae* Wocke and *Dechtria turbidella* H.-S., together with the mine of *D. argyropeza* Zell. for comparison with the last named. The fine paintings of British Tortricidae by Mr. B. Hargreaves for the forthcoming work on that group made microlepidopterists look forward eagerly to its publication by the Ray Society, due in about two years' time.

There appeared to be only four exhibitors who showed Coleoptera, or included them in their exhibits. Mr. S. A. WILLIAMS showed an interesting case of Staphylinidae in which he takes an especial interest, and which comprised: *Quedius plancus* Er., *Deinopsis erosa* (Steph.) *Atheta extima* Sharp and *Ancyrophorus aureus* Fauvel, from flood refuse in the New Forest; *Philonthus ventralis* Grav., from a compost heap near Lyndhurst, Hants, September 1970; *P. umbratilis* Grav. and *P. punctus* Grav., from the muddy banks of a small pond on the Isle of Grain, Kent, October 1970; *Gyrophaena hansenii* Strand, sieved from fresh fungi in the New Forest, October 1970; *Thinobius linearis* Kraatz. sieved from

fine sand on the banks of a stream in the Forest of Bowland, Yorks., May 1970; *Amischa cavifrons* Sharp, beneath stones near Malham Tarn, Yorks., at 1,500 ft., May 1970; *Atheta scotica* El., in flood refuse on the banks of the river Wye, Hereford., May 1970; *Carpelimus unicolor* Sharp, under seaweed, etc., Yarmouth harbour, I.o.W., July 1970; *Oligota apicata* Er., in small bracket fungus, I.o.W., July 1970; *Atheta luridipennis* Mann., on the banks of a small stream, near Blackgang, I.o.W., July 1970.

A *Procræter tibialis* (Lac.) (Elateridae) from Brookmans Park, Herts., constituting a new county record, was shown by Mr. N. TUROK.

Mr. D. APPLETON's substantial exhibit, all of which were significant insects, contained the following which were of particular merit: *Necrodes littoralis* L., from a dead badger in the New Forest, 1.viii.70; *Lomechusa paradoxa* Grav., with ants, I.o.W., 22.iii.67 and 23.v.70; *Acritus homoeopathicus* Woll., in fungus on the site of a wood fire in the new Forest, 8.viii.70; *Silvanus bidentatus* F., under the bark of a fallen oak bough, New Forest, 22.v.70; *Prionychus ater* F., bred from larvae taken in rot hole in a felled oak, New Forest; *Trox scaber* L. in deer offal, New Forest, 8.viii.70; *T. sabulosus* L., in the remains of a jay, Botley Wood, Fareham, 8.v.65; *Odontaeus armiger* Scop., swept after dark, Portsdown Hill, 18.vii.70; and *Acalyptus carpini* Herbst, swept from a boggy area in the New Forest, 12.viii.67.

Very seldom do we see those unusual insects belonging to the Stylopidae which are usually regarded as part of the Order Coleoptera. Fowler calls them 'aberrant Coleoptera', but Kloet and Kincks in their 1945 Check List place them in a separate Order Strepsiptera. Mr. G. E. Else showed some undetermined examples in connection with *Andrena* bees from Blackgang, I.o.W., and *Halictus* bees from Portsdown, Hants.

A number of local and rare Diptera from Ireland were shown by Mr. P. J. Chandler, many of which were new to the country or had been recorded from the odd example only.

An interesting exhibit of fungi and Odonata was presented by Dr. D. A. L. Davis. These had been prepared by the freeze drying technique. Of special interest were *Antogaster gigantica* Fraser, a giant oriental dragonfly, and a male specimen of *Hemianax ephippiger* (Burm.) taken live late at night during 1969 at Tunbridge Wells, Kent.

Mr. G. R. Else exhibited a selection of British Hymenoptera taken during the past season, mainly in Hampshire and included parasitic relationship between various insect Orders.

Living examples of the Surinam Cockroach, *Pycnoscelus surinamensis* (L.) were shown by Mr. A. E. Gardner. This is a subterranean species which does considerable damage to greenhouse plants.

Mr. and Mrs. G. E. Heath showed among several living insects a number of species of praying mantis.

The Hemiptera were well represented this year and great interest was shown in Mr. O. Kudrna's living specimens of the giant reduvid, *Triatoma phyllosoma* one of the largest blood-sucking bugs in the world.

Dr. B. J. MacNulty provided an outstanding exhibit of the aradid bug, *Aradus betulae* (L.). A series of adult and penultimate instar larvae were shown, all bred from larvae found in June 1970 under loose bark of an old birch stump at Glen Affric, Inv. Photomicrographs were also included of this species known previously from only the examples taken by the late P. Harwood at Loch Rannoch in July 1921.

Of the interesting Hemiptera-Heteroptera shown by Dr. M. G. Morris special mention should be made of the following species: *Geotomus punctulatus* (Costa), May 1970, Lands End, Corn.; *Emblethis verbasci* (F.), May, 1970; Lands End; *Lasiacantha capucina* (Germ.), September 1970, the Lizard, Corn.; *Physatocheila costata* (F.), May 1970, New Forest, Hants; and the rare macropterous form of the female of *Mecomma dispar* (Boh.) taken in Bedfordshire in June 1970.

Special mention should also be made of the excellent album of photographs shown by Mr. M. W. F. Tweedie.

12th NOVEMBER 1970

The President, Dr. B. J. MACNULTY, in the Chair

EXHIBITS

Mr. E. S. BRADFORD—Specimens of the moth *Enarmonia saltitans* Westw. (Olethreutidae) reared from the familiar jumping beans which were imported into this country last year, 1969.

Col. A. M. EMMET—(1) *Phyllonorycter dubitella* (Lep., Lithocolletidae) recently added to the British List which he had separated from the series of *P. salicolella* Sirc. in his collection. The two species are not easy to separate and his remarks were of a provisional nature. He was however quite satisfied that he had *P. dubitella* from Darton and Saffron Walden in Essex, from Lee Wood in Somerset and Stapleford in Lincs. He thought perhaps that *P. dubitella* might prove to be the commoner of the two species. (2) Leaf mines of *Tischeria dodonea* Heyd. (Lep., Tischeriidae), a distinctly scarce species close to *T. complanella* Hübn., the mines were taken at Dunsfold, Surrey.

COMMUNICATIONS

A letter from Mr. A. E. G. Best was read by Mr. R. F. BRETHERTON. In it Mr. Best said he had noticed at least 20 examples of *Lycaena phlaeas* L. (Lep., Lycaenidae) near Sedlecombe, Sussex, on 20th October this year. The day was cold, but sunny, and followed a ground frost which had not cleared by mid-day in shady areas. One pair was seen to be *in cop*, the female obviously having only just emerged; the wings were damp and appeared to be still expanding. In replying to Mr. Best Mr. Bretherton had said the species did on occasions produce a third brood, and Mr. Best had then informed him that he had seen another example on 8th November.

Continuing Mr. Bretherton said that he had run his light trap at Bramley for the past ten days which, though mild, were windy, during this time he had taken a single example of *Axylia putris* L. (Lep., Noctuidae). He thought that this too might be a third-brood specimen.

The PRESIDENT announced the gift of three books to the library by Mr. S. N. A. Jacobs, and another work of three volumes donated by Mr. K. A. Spencer.

A discussion took place on the Annual Exhibition and the meeting concluded with a report of the Dunsfold field meeting by Col. A. M. EMMET.

26th NOVEMBER 1970

The President, Dr. B. J. MACNULTY, in the Chair

The following new members were declared elected: Messrs. D. A. Davies, J. F. Gaitens, E. L. Hill and C. D. Side.

EXHIBITS

Mr. S. A. WILLIAMS—Coleoptera from Gressingham, Lancs., taken under stones on the banks of the river Lune, the Carabidae: *Bembidion prasinum* (Dufts.), 14.v.65; *B. atrocoeruleum* Steph., 3.vi.67; *B. lunulatum* (Fourc.), 5.ix.66; *B. fluviatile* Dej., 3.vi.67; *B. decorum* (Panz.), 14.v.65; *B. punctulatum* Drap., 14.v.65; and from flood refuse the following Staphylinidae: *Thalassophilus longicornis* (Sturm), 5.viii.66; *Lathrobium angusticolle* Lac., 5.viii.66; *Scopaeus gracilis* (Spark), 5.viii.66. Also *Meotica exilis* (Er.) (Staphylinidae), a single example taken in flood refuse in the New Forest, Hants, 14.xi.70.

Sir ERIC ANSORGE—An un-named aberration of *Diarsia rubi* View (Lep., Noctuidae) from Chalfont St. Peter, Bucks.

Mr. A. E. GARDNER—The following Coleoptera (Staphylinidae) taken in the nest of the ant *Lasius fuliginosus* (Lat.) (Formicidae) at Mallard Wood, New Forest, Hants, 14.xi.70: *Zyras humeralis* (Grav.), *Z. funestus* (Grav.), *Z. cognatus* (Märk.), *Oxypoda vittata* Märk., and *Gyrohypnus myrmecophilus* (Kies.). From the nests of the Wood Ant, *Formica rufa* L. (Formicidae), at Mark Ash and Brockenhurst, New Forest, 15.xi.70, the staphylinid Coleoptera: *Quedius brevis* Erich., *Notothecta flavipes* (Grav.), *N. anceps* (Er.) *Thyasophila angulata* (Er.) and *Oxypoda formicetcola* (Märk.), and the scymaenid beetle *Scydmaenus torsatus* Müll. Also shown were living queens of the hornet, *Vespa crabro* L. (Hym., Vespidae), taken from a nest at Mark Ash, 14.xi.70.

Col. A. M. EMMET—(1) Mines of *Dechtria intimella* Zell. (Lep., Nepticulidae) from Debden, Essex, showing larva still feeding and the 'green island' in a fallen leaf. (2) A mine believed to be of *Stigmella nitens* Folgone (Lep., Nepticulidae) taken at Debden, Essex, in July 1970. This species is new to the British list. Also shown were the mines of *Nepticula fragariella* Heyd (? *aurella* F.) (Lep., Nepticulidae) for comparison.

COMMUNICATIONS

Referring to his exhibit of *Phyllonorycter dubitella* (Lep., Lithocolletidae) of 12th November, Col. A. M. EMMET said he had sought the opinion of Dr. J. D. Bradley and Mr. E. C. Pelham-Clinton and was now satisfied that only two of his examples were in fact that species. He found the published key was misleading.

The 'green islands' of the Stigmellidae in the leaves they were mining were referred to by Mr. R. F. BRETHERTON. He said he had noticed some on oak leaves and asked what the species might be. Col. Emmet said they could be several species, but added the most likely was *Dechtria quinquella* Bed. 'Green islands' of a similar nature were often made by galls said Mr. S. N. A. JACOBS, particularly the long narrow ones in beech leaves.

Talks were given by Mr. A. E. GARDNER and Mr. S. A. WILLIAMS on 'Coleoptera Collecting and Mounting Techniques'. The talks were followed by a discussion.

10th DECEMBER 1970

The President, Dr. B. J. MACNULTY, in the Chair

The death was announced of Mr. W. J. C. Tonge.

The following new members were declared elected: Capt. A. P. Gainsford and Mr. N. W. Gilroy Scott.

EXHIBITS

Mr. C. MACKECHNIE JARVIS—(1) *Actocharis readingii* Sharp (Col., Staphylinidae), a small apterous species only 1½ mm. in length, named by Sharp in 1870 from examples in various British collections captured years before by J. J. Reading in Plymouth. It occurred at Falmouth in 1886 and at Braunton about 1907. M. Cameron and J. H. Keys captured it again at Plymouth in numbers in 1900 and supplied the collectors of that period. There appear to be no published records since. The exhibited insect was taken sparingly on and under seaweed below the high water mark on the beach on the north coast of St. Mary's, Isles of Scilly in June 1970. (2) *Longitarsus rutilus* (Ill.) (Col., Chrysomelidae). In a recent paper on the genus by the late D. K. Kevan (1967, *Ent. mon. Mag.*, 103: 83–104) the status of this beetle is reappraised and after a century of uncertainty, firmly re-established as British on the evidence of five examples in the Power collection and three in that of Waterhouse, nearly all taken last century. I have taken the insect on *Scrophularia scorodonia* L. on the Island of Tresco in the Scillonian archipelago, in small numbers during several seasons' collecting, which indicates that it is well established there.

Dr. J. NEWTON—A reprint of a paper originally presented to a medical symposium by W. Buttiker on lepidopterous parasites on secretions of the human eye.

COMMUNICATIONS

Referring again to the microlepidopteron *Phyllonorycter dubitella* (Lithocolletidae) which he exhibited on 12th November (p. 18), Col. A. M. EMMET said that Dr. J. D. Bradley was having difficulty separating this insect from *P. salicolella* Sirc. He thought they might yet prove to be one species.

The mine of *Stigmella nitens* Folgone which he showed on 26th November (p. 18) was confirmed as that species by Mr. J. Kilmesch.

A talk was given by Col. A. M. EMMET on 'Breeding Certain Species of Microlepidoptera'. This was followed by a lively discussion.

Autumn Plusia gamma L. (*Lep., Noctuidae*). Dr. C. G. M. Worms' remarks on this species during the meeting of 24th September (p. 8) draws my attention to the fact that whilst the Colchester Natural History Society had their mercury vapour light out in the grounds of Copford Hall, Essex, with the kind permission of Mr. Brian Harrison, M.P., during the same week-end, a number of *Plusia gamma* L. were noted. These were however, all in very fresh condition, which suggested they were most likely recently emerged progeny of spring migrants.—F. D. BUCK, 'Seirotrana', New Road, Tiptree, Colchester, Essex, 3rd October 1970.

Nymphalis io L. (*Lep., Nymphalidae*) and Hibernation. On the 28th December a friend, Mr. E. Arrowsmith, also of Wolverhampton, was rather startled to see a *Nymphalis io* L. fluttering about in his garden. Mr. Arrowsmith caught this butterfly and handed it to me. I quickly introduced it into a breeding cage and, by placing a piece of black material over the cage and storing it in a cool place, I was pleased to see that the specimen returned to a state of hibernation. BERNARD J. LAMPITT, 34 Humphreys Road, Low Hill, Wolverhampton, Staffs. 9th January 1971.

FIELD MEETINGS

BASING FOREST and HECKFIELD HEATH, HANTS—18th April 1970

Leader: Mr. W. GILCHRIST

It was very nice to see at least two dozen members attend this field meeting, in spite of weather which alternated between sunny periods and long, heavy showers. There was a south-westerly wind, force 1 to 2, and the temperature was 13°C.

Basing Forest was entered shortly before midday, and several early geometers were seen: *Trichopteryx carpinata* Borkh., *Anticlea derivata* Schiff., *Ectropis biundularia* Borkh. and *Europhila badiata* Schiff. During one of the sunny spells several *Archiearis* species were seen, but as the wood they were in contained both aspen and birch it was not possible to say which they were. Butterflies seen were: *Pieris rapae* L., *Gonepteryx rhamni* L., *Polygonia c-album* L. and *Nymphalis io* L.,

Mr. R. W. J. Uffen reported *Eriocrania sparrmannella* Bosc., and other micros seen were *Diurnea fagella* F. and a larva of *Haritala ruralis* Scop. Mr. C. O. Hammond saw few syrphid flies about, although *Volucella bombylans* (L.) was seen by several members.

Wild flowers were not much in evidence yet, although violets, primroses, lily of the valley, wild daffodil and *Sedum telephium* L. were seen.

I am grateful to Mr. B. Goater for the list of bryophytes observed, the nomenclature being in accordance with Richards, and Wallace, *An Annotated List of British Mosses*, 1950. The list is not exhaustive, but consists of those species which can be identified with confidence in the field. It does, however, include species which illustrate the characteristic flora of loamy deciduous woodland: *Atrichum undulatum* (Hedw.), *Polytrichum formosum* Hedw., *Fissidens taxifolius* Hedw., *Caratodon purpureus* (Hedw.), *Dicranella heteromalla* (Hedw.), *Dicranoweisia cirrata* (Hedw.), *Dicranum scoparium* Hedw., *Mnium hornum* Hedw. *M. undulatum* Hedw. *Aulacomnium androgynum* (Hedw.), *Thuidium tamariscinum* (Hedw.), *Isothecium myosuroides* Brid., *Brachythecium rutabulum* (Hedw.), *Eurhynchium striatum* (Hedw.), *E. confertum* (Dicks.), *E. praelongum* (Hedw.), *Pseudoscleropodium purum* (Hedw.), *Hypnum cupressiforme* Hedw., *Rhytidadelphus triquetrus* (Hedw.), *R. squarrosum* (Hedw.).

Several migrant birds were also seen or heard; Blackcap, Chiffchaff, Willow Warbler and Swallow. A Great Spotted Woodpecker and several Long-tailed Tits were also observed.

In the afternoon the party moved several miles up the Basingstoke to Reading road to Heckfield Heath. Moths seen here included *Xylocampa areola* Esp., *Eupithecia abbreviata* Steph., *Colestygia multistrigaria* Haw. and *Archiearis parthenias* L.

The meeting ended in a search for clearwings in birch trees on the heath. *Aegeria spheciformis* Schiff. was present in large numbers and *Aegeria culiciformis* L. workings were also seen.

Coleoptera recorded by Mr. de Rougemont were as follows: *Carabus problematicus* Herbst s.sp. *gallicus* Géhin, *Dyschirius globosus* (Herbst), *Bembidion lampros* (Herbst), *Acupalpus dubius* Schil., *Bradyceillus harpalinus* (Serv.), *Pterostichus oblongopunctatus* (F.), *P. vernalis* (Panz.) *Agonum obscurum* (Herbst),

A. assimile (Payk.), *Dromius melanocephalus* Dej., *Agabus chalconatus* (Panz.), *Drusilla* (= *Astilbus*) *canaliculata* (F.), *Atheta* (*Acrotona*) *fungi* (Grav.), *A. (Philhygra) gyllenhali* (Thoms.), *Cypha* (= *Hypocyptus*) *longicornis* (Payk.), *Conosomus testaceus* (F.), *Tachyporus chrysomelinus* (L.) *Philonthus splendens* (F.), *Xantholinus linearis* (Ol.), *Lathrobium punctatum* (Fourc.), *L. multipunctatum* Grav., *L. terminatus* Grav., *Ochthephilum fraticorne* Payk., *Stenus rogeri* Kraatz, *S. impressus* Germ., *Pselaphus heisei* Herbst., *Cerylon histeroides* (F.), *Melanotus rufipes* (Herbst), *Chrysolina staphylea* (L.), *Lochmaea capreae* (L.), *Chalcoides aurata* (Marsh.), *Strophosoma melanogrammum* (Forst.), *Otiorrhynchus singularis* (L.).

Bryophytes recorded show the contrast of species from the acid heath of Heckfield with the loam of Basing Forest, these include: *Polytrichum piliferum* Hedw., *P. juniperinum* Hedw., *P. commune* Hedw., *Campylopus flexuosus* *Leucobryum glaucum* (Hedw.), *Pohlia nutans* (Hedw.), *Acrocladium cuspidatum* (Hedw.) and *Pleurozium schreberi* (Brid.).

BIRCH WOOD and TROTTISCLIFFE, KENT—26th April 1970

*A practical introduction to the study of microlepidoptera
in the field, part 1*

Leader: Mr. J. M. CHALMERS-HUNT

This is the first of the field meetings this year intended as a guide to the incipient microlepidopterist. On this occasion, the Society had the honour of acting as host to the Amateur Entomological Society, a number of whose members was welcomed by the leader among those who assembled at 10.30 a.m. at Bromley South station. The weather was neither windy nor cold, though showers were unfortunately fairly frequent. However, in an April considered the coldest and wettest on record for a good many years, it was felt that conditions could have been far worse.

The party, which included a number of beginners as well as several experienced microlepidopterists, set off in seven cars from the venue for Birch Wood (near West Wickham), a locality which despite its name consists of mixed deciduous woodland and an old larch plantation. Along the edge of this plantation, larval cases of *Coleophora laricella* Hübn. were abundant, attached to young larch shoots, but the cases were still quite small owing to the extreme lateness of the season; and a number of tortricoid larvae—probably those of *Spilonota lariciana* Hein. and *Zeiraphera diniana* Guen., since both occur here—were also noted in the spun shoots or larch. Larval workings of *Blastotere laevigatella* H.-S. were detected in moderate numbers by breaking off the tips of the terminal twigs of larch; and several of these larvae were noticed to have completed their growth from having formed a few inches from the tip, the exit hole and its significant covering of silk preparatory to pupating. As usual, some *B. laevigatella* mines had been torn open and the larvae extracted, probably by tits.

Several of the long subtriangular cases of *Talaeporia tubulosa* Retz. (*pseudobombycella* Hübn.) were taken on tree trunks; but examination of a patch of *Stellaria holostea* L. failed to reveal the larva of *Caryocolum tricolorella* Haw., which spins together the shoots, or either of the two *Coleophora* species associated with this plant.

The party then drove in convoy some 15 miles to Trottiscliffe, where after

suitable refreshment at the Vigo Inn searching began along the banks bordering the Pilgrim's Way. The date was ideal for the larvae of an *Elachista* sp., most of which were full-grown and fairly plentiful in the leaves of *Brachypodium sylvaticum* (Huds.) Beauv. We then moved to the chalk down above, where the early stages of a number of local micros were seen. Notable among these were the larvae of *Agonopterix nanatella* Staint, in their curious tubular habitations in the leaves of Carline Thistle, *Carlina vulgaris* L., formed by drawing the two edges of a leaf together with silk; the beautiful pupa of *Elachista cinereopunctella* Haw., attached externally to the base of the leaf of its foodplant *Carex flacca* Schreb. (*glaucia* Scop.); and the larvae of *Acrolepia perlepidella* Staint. in the mined leaves of *Inula conyzoides* DC. Upon the underside of a leaf of *I. conyzoides* was also observed a small case of *Coleophora conyzae* Zell., readily detectable at first by the brownish patch on the leaf's upperside. The latter is normally abundant by late April.

After what was generally acclaimed to have been an enjoyable and instructive day, the party of fifteen broke up about 5.30 p.m.

CHOBHAM COMMON, SURREY—3rd May 1970

Leader: Mrs. F. M. MURPHY

Ten members and their friends attended the meeting. The day, which followed weeks of cold, wet weather, proved to be very hot and sunny. In the morning some of the party went over towards Sunningdale golf course, and the rest went down to the Long Arm; both parties found *Adela cuprella* Thunb. adults flying.

In the afternoon the remaining members went to the south side of the common near Burrowhill. *Adela cuprella* Thunb. was found in this area also. Mr. C. O. Hammond found an interesting solitary bee, *Nomada leucophaelma* (Kirby). Two immature examples of the rare spider *Oxyopes heterophthalmus* Lat. were seen in the afternoon. The presence of this spider on Chobham Common was first discovered by a member of the Society. The beetle *Carabus arvensis* Herbst ssp. *silvaticus* Dej. was taken and the following spiders were recorded: *Dictyna arundinacea* (L.), *Clubiona compta* C. L. Koch, *Xysticus cristatus* (Clerck), *Euophrys frontalis* (Walck.), *Evarcha arcuata* (Clerck), *Lycosa pullata* (Clerck), *Trochosa terricola* Thor., *Araneus redii* (Scop.), *Cercidia prominens* (West.), *Monocephalus fuscipes* (Blackwall), *Erigone atra* (Blackwall), *Centromerita bicolor* (Blackwall) and *Lepthyphantes zimmermanni* (Bert.).

DERBYSHIRE—16th–17th May 1970

Leader: Col. A. M. EMMET

The purpose of this meeting was to collect larvae of microlepidoptera with a local or northern distribution. It was attended by about a dozen members, half from the north midlands and the rest from the south.

The main objective on the first day was *Euyponomeuta stanella* Thunb., whose larva feeds on Orpine, *Sedum telephium* L. Dovedale is the only known locality for this species in Britain, but before going there the party examined the largest stand of Orpine in the district, which is located on a disused railway track at Tissington. The search there having proved unsuccessful, a move was made to

Dovedale itself, where the Orpine was still very small and consequently difficult to find. No trace of *E. stannella* was detected, but this need not mean that it is extinct in the area; the larvae may have been confined to certain patches of the foodplant which were undetected, or alternatively, it may have been too early in what was, up till then, a very late season.

The search for larvae of other species was successful. The most interesting find was *Amelia unitana* Hübn., whose larvae were feeding on Wood Garlic, *Allium ursinum* L. The identity of the species was not recognised at the time and few were taken; from these three imagines were reared. Spinnings on Red Campion, *Silene dioica* (L.) Clairv., produced *Caryocolum viscariellum* Staint. and a second species which was not identified or bred. A bush of Bird-cherry, *Prunus padus* L., was found to be festooned with webs of *Yponomeuta evonymella* L. Although fresh supplies of the foodplant, at any rate for the southerners, would be hard to come by, larvae were taken and some were reared successfully on plum, though the moths were undersized. Success was only achieved where both species of *Prunus* were at first provided together and where after the supply of Bird-cherry was exhausted, its pungent remains were still kept in the breeding container. Sundry other larvae were found in Dovedale, but these were of species of general distribution and therefore of no special interest.

On Sunday, the 17th May, the meeting transferred its activities to Great Hucklow where, at a height of over 1,000 ft, *Vaccinium vitis-idaea* L. grows plentifully. The backwardness of the season was even more apparent at this altitude, and tortricid larvae in spinnings were unusually small for the time of the year. The normally common *Phyllonorycter (Lithocolletis) junoniella* Zell. was very scarce, possibly because the mines were too underdeveloped to be easily detected. Other species of larvae taken on Cowberry were *Rhopobota ustomaculana* Curt., *Lozotaenia fosterana* L., *Olethreutes mygindana* Schiff., *Coleophora vitisella* Gregs. (both first-year larvae and second-year pupae) and *Fomoria weaveri* Staint. *Vacinium myrtillus* L. furnished larvae of *Rhopobota naevana* f. *geminana* Steph. and *Apotomis sauciana* Fröl.

The larvae of macrolepidoptera were not neglected and those taken included *Scopula ternata* Schrank, *Entephria caesiata* Schiff., both bred, and *Amathes castanea* Esp. Among imagines netted in flight were *Ancylis myrtillana* Treits., which was on the wing only up to about noon, and *Argyrotaenia pulchellana* Haw., which started to fly after about 4 p.m.

Miss K. Hollick, a well-known local botanist, kindly helped with advice on localities for Orpine. She also suggested that the party should look out for *Vaccinium x intermedium* Ruthe, the cross between *V. vitis-idaea* L. and *V. myrtillus* L., at Great Hucklow, as it had not hitherto been recorded from that locality. The cross was duly found by Mr. R. W. J. Uffen and a voucher specimen has been placed in the Derby Museum where the county botanical records are kept.

GOMSHALL, SURREY—30th May 1970

Leader: Mr. ALAN E. STUBBS

A party of five spent the morning on a piece of common land at the eastern edge of the village. Alder woods and marshes here line a small stream and an open area of rough grassland lies adjacent.

Attention was paid mainly to the streamside and alder woods. The weather

was rather poor for Lepidoptera and *Euchoea nebulata* Scop. was one of the few species flying. An unsuccessful search was made for *Xanthorrhoea biriviata* Borkh., though the habitat conditions were ideal and a strong colony lies only a few miles away; this moth is most active in the afternoon so perhaps we were too early. Sweeping herbage along the stream bank yielded two craneflies which are rare in south-eastern England: *Limnophila verralli* (Berg.) and *Dicranota subtilis* Loew.; plus two local species *Thaumastoptera calceata* Mik. and *Ptychoptera lacustris* (Meig.). The scatophagid fly *Cnemopogon apicalis* (Meig.) and the fungus gnat *Apemon marginata* (Meig.) were among the interesting species found at the edge of the wood. In the latter area the acalypterate fly, *Palloptera saltuum* (L.), was common on the foliage of a young willow, mostly in a teneral condition suggesting a breeding site close by; it is exceptional to find more than the odd individual of the species. In total there were 30 species of tipulid flies at this locality—ten per cent of the British fauna, which is exceptional for such a small area. The previous week a local farmer said he would like to plough the land, but his wishes were frustrated by common land status.

During lunch-time discussion mention was made of a patch of Butterbur, *Petasites hybridus* (L.) Gaert., Mey. & Schreb., growing by the waterworks at Shere. This is a rare plant for Surrey, so the opportunity was taken of searching for *Limonia ornata* (Meig.), a scarce cranefly associated with this plant. Several of these attractively marked flies were found flying about the leaves of the plant; this is only the second record for the county following its discovery at Box Hill in 1969, the first record for south-east England.

Attention was transferred to Hackhurst Downs where a most profitable afternoon was spent in the Juniper area owned by the National Trust and subject to management advice by Surrey Naturalists' Trust. The area was very good for microlepidoptera, the records for which are not yet available. Among the interesting species of Diptera were the cranefly *Limonia nigropunctata* Schum., flying frequently in the scrub areas, the robber fly *Leptarthrus brevirostris* Meig., the empid *Rhamphomyia atra* Meig., the acalypterates *Lauxania cylindricornis* (F.) and *Lyciella platycephala* (Loew.) and the scatophagid, *Cordilura pubera* (L.). One of the more unusual observations was on the membracid homopteron *Centrotus cornutus* (L.). Three individuals were found on the bare soil of a destroyed nest of the ant, *Lasius flavus* (F.), and close by another example sat on another nest.

HOLMWOOD, SURREY—7th June 1970

Leader: R. FAIRCLOUGH

The attendance on this hot Sunday was seven, including the leader. It was hoped to have taken *Clytia ambigua* Hübn., but though the *Frangula alnus* Mill. bushes were worked by those who were anxious to see this moth, the search was unsuccessful. Drooping shoots of the bushes were collected in the expectation of breeding *Sorhagenia janiszewski* Riedl. Large numbers of *Gonepteryx rhamni* L. larvae were seen, some very large, while the 1969 imagines were still on the wing. Other species noted were: *Anthocharis cardamines* L., *Polyommatus icarus* Rott., *Celastrina argiolus* L., *Erynnis tages* L., *Pterostoma palpina* Clerck, *Zanclognatha nemoralis* F., *Acronutria nana* Haw., *Ptycholoma lecheana* L., *Eulia ministrana* L., *Roeslerstamnia erxlebella* F. and *Telphusa proximella* Hübn.

STANFORD-LE-HOPE, ESSEX—14th June 1970

Leader: Mr. R. TOMLINSON

Three members and three visitors met at the railway station and found five species of fairly common moths on the station. We drove to Mucking Church, where Ron Payne found some interesting flies on the ivy on the church wall. Eric Bradford checked the blackthorn thickets, whilst one of our visitors, Graham Glombels, swept for Hemiptera among the grass and nettles bordering the reed-beds. After a couple of hours or so we drove to the nearby 'Golden Gates' locality where we had lunch. Two of the visitors had by then wandered off birdwatching and were not seen again that day.

The day had been warm and mostly cloudy, and with strong winds from an easterly direction. A successful collecting day, particularly in the case of Diptera and Lepidoptera. The following insects were noted:

DIPTERA: *Syrphus albostriatus* Fall., *Helophilus versicolor* F., *H. frutetorum* F., *Trophidia scita* Harris, *Platycheirus fulviventris* Macquart, *Syrphus compositarum* Verrall, *Pipeza noctiluca* L., *Eumerus strigatus* Pall., *Chrysotoxus bicinctum* L. and *Chrysops relictus* Meig.

HEMIPTERA: *Stenotatus binotatus* (F.), *Capsus ater* (L.), *Psallus varians* H.-S., *Lygocoris populinus* L., *Liocoris tripustulatus* (F.), *Cylleloris histrionicus* Phylus *melenocephalus* L., *Peraeocoris olivaceus* F. and *Leptopterna dolobrata* L.

LEPIDOPTERA: *Pieris brassicae* L., *Pararge aegeria* L., *Coenonympha pamphilus* L., *Aglais urticae* L. (larvae on nettles), *Mimas tiliae* L., *Malacosoma neustria* L. (larvae), *Philodoria potatoria* L. (larvae), *Saturnia pavonia* (larvae), *Fumaria casta* Pall. (larvae), *Hepialus lupulina* L., *Melanchra persicariae* L., *Caradrina morpheus* Hufn., *Zanclognatha cibrumalis* Hüb., *Calothysanis amata* L., *Xanthorhoe montanata* Schiff., *Ostrinia nubilalis* Hüb., *Sitochroa verticalis* L., *Crambus pratellus* L., *Pseudaargyrotoza conwayana* F., *Aleimma loeflingiana* L. (one pupa), *Tortrix viridana* L. (several pupae), *Laspeyresia nigricana* F., *Epinotia trimaculana* Don., *Apotomis pruinana* Hüb., *Hedya salicella* L., *Olethreutes lacunana* Schiff., *Telphusa fugitivella* Zell., *T. luculella* Hüb., *Chrysoclista linneella* Clerck, *Carcina quercana* F. (several pupae), *Phthophila fabriciana* L., *Argyresthia pygmaeella* Hüb., *Yponomeuta padella* L. (several larvae), *Nemotois degeerella* L. and two species of Nepticulidae, one of which was *Dechiria albifasciella* Hein., the other species, taken in numbers at present remains unidentified. Finally two *Ypsolophus* cocoons taken from the trunk of an oak by Eric Bradford produced ichneumons.

WISLEY COMMON, SURREY—21st June 1970

Leader: Mr. J. A. C. GREENWOOD

The wonderful weather did not offset the decision by British Railways to close the whole railway complex in the area for the day and to replace it by bus services of uncertain timing. Partly as a result of this confusion there was an attendance of only four.

Some time was spent in the hope of seeing other members, and those present then made a short tour before deciding to disperse and leave the secrets of Wisley to be explored by a better attended meeting.

However, it was possible to record with pleasure a specimen of *Limenitis camilla* L., which was not only early but had not been recorded from Wisley by any of those present. A number of common species were also seen.

WHITE DOWNS, SURREY—11th July 1970

Leader: Mr. R. F. BRETHERTON

On an unpromising morning, only four members attended; but the weather improved as the collecting ground was reached about 11 a.m., and it later became sunny and warm. The barer chalk slopes on the east side of the Effingham-Abinger road were worked before lunch and those on the west side, which are becoming much overgrown by scrub, afterwards.

Only 12 species of Rhopalocera were seen, but most of these were abundant. They included several dozen *Mesoacidalia charlotta* Haw. (*aglaia* L.), which has recently been rare in Surrey, and many hundreds of *Aphantopus hyperantus* L., among which a dwarf male of ab. *cæcra* Fuchs was secured. Heterocera proved difficult to disturb from the still wet vegetation, but there were many unusually small *Zygaena filipendulae* L., and pyrales and plumes were much in evidence. A notable find was a pair of the clearing *Dipsosphecia scopigera* Scop. at rest on a blossom of *Crepis* at about 11.30 a.m. Unfortunately no more could be found, despite much searching and sweeping, through many other blossoms were occupied by a species of Hymenoptera which is presumably mimicked by the clearwing.

The ground and weather for this meeting deserved a better attendance than it received. Coleopterists and dipterists in particular would have found, and no doubt identified, many interesting species.

ARUNDEL PARK, SUSSEX—2nd August 1970

Leader: Mr. D. STIMPSON

Four members attended this meeting which took place on an extremely hot and sunny day.

The party entered the park by the north-west gate and after a quarter of a mile or so turned north across a meadow and worked patches of scrub and a group of trees.

There were plenty of insects about but nothing of special note was taken. A female *Lucanus cervus* (L.) was found under bark.

After lunch the party moved downhill towards the river. There were many felled beeches which were of interest to the coleopterists present and indeed on the lower slopes quite a large area of woodland had been felled.

Out in the open on a patch of thistles *Gonepteryx rhamni* L. were so numerous that a number could have been taken with one sweep of the net. Also flying were *Vanessa atalanta* L., *V. cardui* L., *Nymphalis io* L. and *Aglais urticae* L. in some numbers.

The lepidopterists took a number of moths such as *Lygris mellinata* F., *Euphia bilineata* L., *Ortholitha chenopodiata* L. and *Xanthorhoe ferrugata* Clerck, but again nothing of special interest was noted.

After working the lower slopes the party worked back to the cars and the last thing noted was *Polygona c-album* L. at rest just outside the park gates.

The day was too hot and sunny for many insects to be active and although the meeting did not produce anything of real note a pleasant day was passed by all present.

HACKHURST DOWNS, SURREY—9th August 1970

Leader: Mr. L. J. D. WAKELY

The sun never quite got through, but the two lepidopterists attending found *Aricia agestis* Schiff., *Polyommatus icarus* Rott. and *Lysandra coridon* Poda in fair numbers along the more open parts of the hillside. Other species of butterfly noted were *Pieris rapae* L., *Pararge megera* L., *P. aegeria* L., *Coenonympha pamphilus* L., *Aphantopus hyperantus* L., *Vanessa cardui* L., *Nymphalis io* L. and *Thymelicus sylvestris* Poda. No other kind of entomologist turned up.

FAVERSHAM, KENT—22nd August 1970

Leader: Mr. E. S. BRADFORD

From weather reports and remarks made by two of the five members who arrived for the meeting a wet day was expected. Although it looked threatening at times we were fortunate that it held off and eventually proved rather pleasant with occasional sunshine.

The greater part of the day was spent along Faversham Creek itself. One area of Ham Marshes was visited for a short time but nothing of note was seen. An interesting observation was of a rather energetic geometrid larva. When first seen it was hanging by a thread about nine inches below a leaf. It was then seen to climb up the thread, at a speed which surprised the witnesses.

Lepidoptera seen or taken during the day were: *Pieris brassicae* L., *P. rapae* L., *P. napi* L., *Pararge megera* L., *Maniola jurtina* L., *M. tithonus* L. *Coenonympha pamphilus* L., *Lycaena phlaeas* L., *Polyommatus icarus* Rott., *Thymelicus sylvestris* Poda, *Smerinthus ocellata* L. larva on *Salix*, *Phalera bucephala* L. several colonies of larvae were found some of which were on *Salix*, *Callimorpha jacobaeae* L. larvae not common on *Senecio jacobaea* L., *Fumaria casta* Pall. several larval cases found, *Amathes c-nigrum* L., *Proucus furuncula* Schiff., *Plusia gamma* L., *Rivula sericealis* Scop., *Calothysanis amata* L., *Euphyia bilineata* L., *Anaitis plagiata* L., *Ortholitha chenopodiata* L., *Eupithecia centaureata* Schiff., *Nomo-phiila noctuella* Schiff., *Haritalia ruralis* Scop., *Agriphila culmella* L., *A. geniculea* Haw., *A. tristella* Schiff., *Platyptilia gonodactyla* Schiff., *Aethes smethmanniana* F., *Dichrorampha simpliciana* Haw., *Enarmonia formosana* Scop., *Olethreutes lacunana* Schiff.

Hog's Fennel, *Peucedanum officinalis* L., of which there is a good growth along Faversham Creek, was inspected for *Agonopteryx putridella* Schiff. Although many larval spinnings were found and dissected none were tenanted and the moth was not discovered. It was perhaps, a bit late to find it on the wing.

The carcase of a dead swan was seen on the Ham Marshes which might have been productive to members interested in other Orders, but nobody present seemed desirous to explore it.

THURSLEY, SURREY—6th September 1970

Leader: Mr. ALAN E. STUBBS

Eight members joined the meeting on a very pleasant if not too productive day on Thursley Common.

We were met by the warden and conservation officer of Surrey Naturalists'

Trust and examined the progress being made with the dragonfly management on their reserve. It was late in the season to see these insects at their best, but cleared pools and ditches were settling down very well. The species seen were *Aeshna juncea* (L.), *Orthetrum coerulescens* (F.), *Sympetrum striolatum* (Charp.), *S. danae* (Sulz.) and *Lestes sponsa* (Hanse.). Several *Sericomyia silentis* Harris, a handsome, large brown and yellow hoverfly, were seen in this area.

At the edge of the common larvae of *Ceramica pisi* L., *Apatele rumicis* L., and *Biston betularia* L. were found and *Pararge aegeria* L. was flying in a pine/molinia area. Several interesting insects were found at the edge of a deciduous woodland area in the middle of the common, including blister mines of the trypetid fly, *Acidia cognata* Wied. in the leaves of Coltsfoot, *Tussilago farfara* L., and a specimen of *Limonia morio* (F.) (subject to confirmation), the first record of this cranefly in Surrey.

Along one of the rides across the heath, the fly *Scatopse fuscipes* Meig. was found at a standing dead pine trunk without bark. Several were running in and out of cracks in the trunk about five feet above the ground, and others were hovering close by. This behaviour seems odd since the larvae are recorded from dung and a less certain record is from rotting onions.

ADDINGTON, SURREY and WESTERHAM, KENT—20th September 1970

*A practical introduction to the study of
microlepidoptera in the field, part 2*

Leader: Mr. J. M. CHALMERS-HUNT

For this outing on the last day of summer and the warmest September day since 1959, the weather was perfect, with continuous sunshine and calm yet unoppressive conditions.

We started on the well-known, entomologically rich, flowery fields that adjoin Featherbed Lane, Addington. This is a splendid locality for the very local and beautiful *Phalonia flavigilia* Westw., and accordingly we collected seed-heads of its foodplant *Scabiosa arvensis* L. for the full-grown larva which feeds inside a seed capsule spun to a dead head.

The cases of *Coleophora nutantella* Mühl. and those of *C. spissicornis* Haw. were taken on the seed-heads of *Silene vulgaris* (Moensch.) Garcke and flower-heads of *Trifolium pratense* L. respectively. Mr. J. Roche spotted a single case of *C. artemisicolella* Bruand on a seed-head of *Artemisia vulgaris* L.—quite a feat as the cases are difficult to find; and a number of cases of the gelechiid *Thiotricha subocellea* Steph. were collected from the seed-heads of *Origanum vulgare* L.

On the hedge bordering this field, *Rhamnus catharticus* L. leaves spun pod-fashion, each contained a larva of *Ancylis unculana* Haw. (*cerasana* Hübn.); and the following nepticulid species were noted mining leaves: *Dechiria pulverosella* Staint., on crab apple; *Nepticula oxyacanthae* Frey, on hawthorn; and on the higher ground, tenanted larval mines of *N. poterii* Staint. were quite common on *Potentilla sanguisorba* L.

After refreshment at the Cricketers Arms, Addington, Col. Emmet suggested a drive of some ten miles to the south-east to a wood near Westerham in Kent, to look for more nepticulid larvae. *Nepticula myrtillella* Staint., which the leader had taken there on *Vaccinium myrtillus* L. on 4.ix.65, and had since been taken

by Col. Emmet in numbers, was the main goal, and many were noted in the leaves, but the species is very local.

After an enjoyable and interesting day, those present dispersed at about 6.30 p.m.

OUTWOOD COMMON, SURREY—3rd October 1970

Leader: Mr. K. G. W. EVANS

The unhappy weather conditions undoubtedly accounted for the fact that the train at Salfords station failed to disgorge the dozens of members expected. However, the leader and Laurie Evans were received by three members of the Croydon Natural History Society.

Substantial quantities of sugar were liberally dispensed and one mercury vapour and one actinic light were set up in positions known to be usually rewarding.

Although the night was moonless and there was little wind, the sugar, carefully prepared to well proven recipes, failed dismally to produce effective results. Attending were: *Allophyes oxyacanthalae* L. (15), *Catocala nupta* L. (1) and *Hypena proboscidalis* L. (2).

During the rounds of the sugar and when passing the churchyard the party became a little disconcerted on hearing eerie sounds uncomfortably similar to heavy breathing. This was eventually traced, with some relief, to a pair of large Barn Owls occupying a narrow window in the church.

The lights were maintained until about 12.45 a.m. and the results were: *Amathes c-nigrum* L., *Leucania pallens* L., *Allophyes oxyacanthalae* L., *Episema caeruleocephala* L., *Agrotis segetum* Schiff., *Agrochola macilenta* Hübn., *A. lota* Clerck, *A. lychnidis* Schiff., *Anchoscelis helvola* L., *A. litura* L., *Citria lutea* Stroem., *Dryobotodes eremita* F., *Gripotia aprilina* L., *Tiliacea aurago* Schiff., *Gortyna flavago* Schiff., *G. micacea* Esp., *Aporophyla lutulenta* Schiff., *Conistra vaccinii* L., *C. ligula* Esp., *Hypena proboscidalis* L., *Opisthograptis luteolata* L., *Dysstroma truncata* Hufn. and *Colotois pennaria* L.

DUNSFOLD, SURREY—8th November 1970

Leader: Col. A. M. EMMET

The meeting was attended by 14 members. The main quarry was *Coleophora wockeella* Zell., whose larva had been rediscovered in the area in 1969 after a lapse of some 30 years. A search of the wood where larval cases had been taken the previous autumn proved unproductive, for only a single example had been found by lunchtime. The party therefore moved to Botany Bay Wood, a mile or so away, where *C. wockeella* proved to be relatively plentiful. About 50 cases were found and distributed among the party. The larval feeding-places were conspicuous enough, but the cases were sometimes difficult to see, as many had attached themselves to stems for hibernation.

Many other leaf-mining larvae were found, the most interesting of which was *Tischeria dodonaea* Heyd., which was almost as numerous as its common relative *T. complanella* Hübn. Unfortunately about 90 per cent were parasitised. Other

larvae noted or taken included *Scrobipalpa acuminatella* Sirc., *Parornix betulae* Staint., Stigmellidae of the *Stigmella atricapitella* Haw. group, *S. betulicola* Staint. and/or *S. luteella* Staint., *S. regiella* H.-S., *Nepticula salicis* Staint., *N. aurella* Staint., *Dechtria argentipedella* Zell., *D. subbimaculella* Haw., *D. intimella* Zell. and *Fomoria septembrella* Staint. Mines in *Agrimonia eupatoria* L., some of which were still tenanted, were probably of *Nepticula fragariella* Hein. Vacated mines which were noted included *Stigmella basiguttella* Hein. (relatively plentiful for an uncommon species), *Dechtria albifasciella* Hein. and *Heliozela betulae* Staint.

Solidago virgaurea L. was widespread and certainly harboured *Coleophora virgaureae* Staint. Some members collected the heads on the chance of their also holding phaloniid or plume larvae. The seed-heads of *Pulicaria dysenterica* (L.) Bernh. were found to contain larvae tentatively identified as *Isophrictis bifractella* Dougl. Spongy galls were common on oak leaves and were collected for the species of *Pammene* that feed within. *Phyllonorycter* mines were in plenty on several foodplants, but there was hardly time to attend to them. Nevertheless mines of *P. emberizaepennella* Bouch. were taken on *Lonicera* as well as mines in the leaves of *Salix caprea* L., in case any should turn out to be the newly discovered *P. dubitella* H.-S.

It was unfortunate that there were no coleopterists, dipterists of hymenopterists present, as many mines made by the larvae of these Orders were observed. However, quite a large bag of leaves containing parasitised lepidopterous larvae was subsequently handed over to the hymenopterists at the British Museum (Nat. Hist.).

BOOK REVIEWS

Wings Across the Meadow. By Jo Brewer. 9 in. \times 6 in., 190 pages, J. M. Dent & Sons Ltd., 1970. 35s.

This book presents the life-history of the Monarch butterfly in a narrative, non-technical, form. The author has obviously taken considerable pains to ensure factual accuracy and has produced an eminently readable book.

Though most of our members would probably prefer their entomology less wordy, even if it could perhaps be no more scientifically accurate, our younger friends and relatives would really enjoy this work if they have any interest in natural history at all—the romantic approach should appeal to them.

The book is copiously illustrated throughout the text with artistic pencil sketches of many natural history subjects besides the Monarch. It is beautifully printed by offset lithography from the original American text.

Anyone with a gift problem to solve might consider this book.

Rearing Stick Insects. Dy. 8vo. 20 pp. A.E.S. Leaflet No. 20. 6s.

This booklet covers the breeding and rearing of the Common, Madagascan and Corsican Stick Insects particularly, and provides details of other species liable to be available. It deals fully with the life-history and breeding cages, and offers suggestions for experimental studies.

A key is given for imagines and the older nymphs and another for the eggs to generic level; with this last named is an excellent plate of the eggs showing their characteristics.

The Society's Publications

Back numbers of the Society's Publications still in print are becoming scarce. We regret therefore that we have had to reassess their value and new prices have been agreed. These are as follows:—

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* These copies are very scarce and contain papers in great demand. Member's discount cannot therefore be allowed.

A GUIDE TO THE SMALLER BRITISH LEPIDOPTERA by L. T. FORD, B.A.

This important work on the British Microlepidoptera is still available.

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MEETINGS OF THE SOCIETY

are held regularly at the Society's Rooms, but the well-known ANNUAL EXHIBITION takes place in the autumn in the Conversazione Room at the British Museum (Natural History). Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings. The current Programme Card can be had on application to the Secretary.

JULY 1971

Vol. 4 Part 2

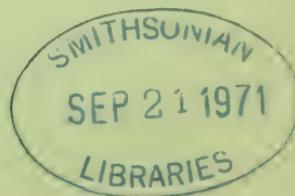
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PROCEEDINGS

14th JANUARY 1971

The President, Dr. B. J. MACNULTY, in the Chair

EXHIBITS

Mr. S. N. A. JACOBS—A coloured print of a photograph by Mr. J. B. Fisher of *Gortyna borellii* Pierre ssp. *lunata* Freyer (Lep., Noctuidae), a species new to Britain taken by him in Britain. Three specimens were taken and the determination of the first verified by M. Boursin, who expressed no surprise at its appearance on this side of the North Sea, having *Gortyna hucherardi* Mab., a reasonably near relative, in mind.

Mr. F. D. BUCK—A series of advertising leaflets depicting Coleoptera and Hemiptera in colour.

Mr. C. O. HAMMOND—A living example of *Chrysopa carnea* Steph. (Neur., Chrysopidae), the only British species of the family which may be found in the imago stage all through the year. The colour changes to a dull brown during hibernation. The exhibited insect was taken at light at Wood Green, N. London, 8.1.71.

Mr. M. CLIFTON—*Syntomus stenoptera* Zerny and *S. consimilis* Hamps. (Lep., Syntomidae), two species occurring in similar habitats in the same area, from the Kurura Forest, Kenya, but which do not usually meet. *S. stenoptera* occurs along shaded paths where the trees meet overhead. *S. consimilis* on the other hand is found along wide paths with the trees well back providing no overhang. The larvae of both species are grass feeders in the early stages feeding on the dead rotting grass at the bottom of the clump, in the later stages feeding on the green grass blades further up. In captivity they take readily to flowers of the Compositae. The example of *S. consimilis* shown feeding on groundsel.

COMMUNICATIONS

Xylena vetusta Hübn. (Lep., Noctuidae) was reported by Dr. C. G. M. DE WORMS to have been taken by Mr. Wanstell in his moth trap at Brentwood that morning.

Mr. R. MEW, in a letter, recorded rearing *Acherontia atropos* L. (Lep., Sphingidae) from an egg which he had found on the upper side of a leaf on an ash tree in the south of France on 22nd July last. It hatched the next day and was fed on ash until it pupated on 4th October, the moth emerging, slightly damaged, on 8th November. At the time when the egg was found a number of other eggs in a similar situation were also found, but all had hatched and no larvae could be found.

Mr. S. N. A. JACOBS remarked on a reproduction of a mural from the tomb of Tutankhamen on the jacket of a book of his grandson's. It included butterflies clearly identifiable as *Danaus chrysippus* L. (Danaidae).

Coloured transparencies were shown by Dr. C. G. M. DE WORMS, Mr. M. W. F. TWEEDIE, Mr. C. O. HAMMOND and Mrs. F. MURPHY.

28th JANUARY 1971

99th ANNUAL GENERAL MEETING
 (with which was combined the ordinary meeting)

The President, Dr. B. J. MACNULTY, in the Chair

EXHIBITS

Mr. S. A. WILLIAMS—*Aleochara ruficornis* Grav. (Col., Staphylinidae), a single example sieved from flood refuse collected in the New Forest, S. Hants, 13.xi.70.

Mr. M. CLIFTON—An unidentified male ascalaphid from Africa showing a remarkable Y-shaped process on the second segment of the abdomen.

Mr. E. S. BRADFORD—(1) A *Eupithecia centaureata* Schiff. (Lep., Geometridae) found flying in the living room of a block of flats in Holloway, London, N.7., 23.i.71. (2) A gelechiid moth bred from a larva found feeding on tomato fruit bought in Boreham Wood, Herts., which emerged 27.i.71.

Mr. A. E. STUBBS—A box of insects from Nairobi, Kenya.

COMMUNICATIONS

Mr. A. E. STUBBS commented on a threat to Benfleet and Hadleigh marshes

A male *Alsophila aescularia* Schiff. (Lep., Geometridae) was reported to have been seen recently in Wimbledon, S.W. London; and Mr. E. S. BRADFORD said that a few days previously he had noticed bees were active in N. Finchley, London, N.12.

Mr. R. F. BRETHERTON announced that Mr. & Mrs. T. G. Howarth had donated £10 10s. to the Centenary Fund from the proceeds of teas provided before the meetings.

The Treasurer, Mr. R. F. BRETHERTON, read his report on the Society's finances and moved its adoption. Mr. J. M. Chalmers-Hunt seconded the report which was carried.

The Council's report was presented by Mr. B. GOATER who moved the adoption; the report was seconded by Dr. C. G. M. DE WORMS and was carried.

The Editor's Report was presented by Mr. F. D. BUCK and seconded by Mr. S. N. A. JACOBS; the Librarian's Report by Mr. S. A. WILLIAMS and seconded by Mr. S. N. A. JACOBS; the Curator's Report by Mr. A. E. GARDNER and seconded by Mr. B. SKINNER. All were carried.

The President declared the following officers and Ordinary Members of Council elected for the ensuing year: *President*, Col. A. M. EMMET, M.B.E., T.D., M.A., F.R.E.S.; *Vice-Presidents*, B. J. MACNULTY, PH.D., B.Sc., F.R.I.C., F.R.E.S., and Prof. H. E. HINTON, PH.D., B.Sc., F.R.S., F.R.E.S.; *Treasurer*, R. F. BRETHERTON, C.B., M.A., F.R.E.S.; *Secretary*, P. J. BAKER, F.R.E.S., F.R.H.S.; *Editor*, F. D. BUCK, A.M.I.P.T.G.M., F.R.E.S.; *Curator*, A. E. GARDNER, F.R.E.S.; *Librarian*, S. A. WILLIAMS, F.R.E.S.; *Lanternist*, M. SHAFFER; *Ordinary Members of Council*, E. S. BRADFORD, D. J. CARTER, R. G. CHATELAIN, Capt. J. ELLERTON, D.S.C., R.N., K. G. W. EVANS, B. GOATER, B.Sc., M.I.BIOL., D. C. GRANGE, A. S. F. RIPON, K. A. SPENSER, PH.D., F.R.E.S., L. J. D. WAKELY, C.M.G., O.B.E., M.A.

Under bye-law 25(b) Mr. P. N. CROW asked about the security of tenure at

the Alpine Club. In reply Mr. R. F. Bretherton and Mr. A. E. Gardner reassured him.

Dr. B. J. MACNULTY read his Presidential Address on acarine associations with insects (see p. 45).

A vote of thanks to Dr. MacNulty was moved by Col. A. M. EMMET, the incoming President, with which he coupled a request for permission to publish the Address just given. In his reply Dr. MacNulty agreed.

Mr. R. W. J. UFFEN proposed a vote of thanks to the Officers and Council which was seconded by Mr. R. TUBBS and carried. Dr. M. G. Morris replied.

A vote of thanks to the Auditors was proposed by Mr. P. N. CROW and seconded by Mr. R. W. J. UFFEN. The vote was carried by acclamation.

COUNCIL'S REPORT 1970

1970 was European Conservation Year. Dr. M. G. Morris and Mr. A. E. Stubbs have represented the Society on several occasions at meetings of outside bodies which have been concerned with arrangements for it. Thanks to the initiative of Mr. G. Prior, mobile exhibits with a conservation theme were constructed as a joint project with the Amateur Entomologists' Society and have been displayed in public libraries in and around London. One of the Society's Ordinary Meetings was devoted to a thoughtful discussion of the relation between collecting and conservation, which has been summarised in the Proceedings.

The Society's membership has resumed its growth, from 582 at the end of 1969, to 600 at the end of 1970, made up of 6 Honorary and 2 Special Life, 275 Ordinary, 272 Country and 45 Junior members. It is encouraging that a high proportion of the new members are Junior. There was, however, a loss of members through death, resignation or cancellation of membership. A new list of members and their addresses, revised to 21st February 1970, with a geographical analysis, has been circulated.

The programme for Ordinary Meetings, arranged by Mr. D. J. Carter, has been both varied and interesting, and the attendance has usually been high. As in the past, Mr. and Mrs. T. G. Howarth, helped by Mrs. Lewis of the Alpine Club, have contributed much to the sociability of these evenings by their service of tea and biscuits. Attendance at Field Meetings, arranged by Mr. G. Prior, has ranged from 2 to 21, the season ended with a very successful hunt for micro-lepidoptera at Dunsfold on the day after the Annual Exhibition. The reasons for the uneven popularity of the Field Meetings are not clear, and Mr. Prior would welcome ideas for improvement.

At a Special Meeting on the 23rd April, the Society adopted regulations to govern the Professor Hering Memorial Research Fund, thus following up the generous gift by Frau Hering, widow of the late Professor E. M. Hering, which was recorded in last year's Report, of a capital sum to assist research in the fields of entomology in which Professor Hering was particularly interested. Conditions for awards from the Fund were advertised in the leading entomological journals, and in November, the Management Committee was able to offer an award of £100 to Mr. H. Andersson, of Lund, Sweden, to help him in the study of Indian and African Chloropidae.

The Annual Exhibition was again held in the Conversazione Room at the British Museum (Nat. Hist.)—a privilege for which the Council is grateful to

the Trustees. There were some 90 exhibitors and a very full attendance, which was justified by the high standard and varied interest of the exhibits. The Society itself exhibited at the exhibitions of the Amateur Entomologists' Society and of the Schools Natural History Society.

The Christmas Card, figuring a dragonfly, was again designed by Mr. Alan Palmer, and notably successful arrangements for its advertisement and sale were made by Miss K. H. Brookes.

The Annual Dinner, on 6th November, was again held at Fleming's Hotel. It was attended by 71 members and guests.

A further supply of the Society's ties has been bought. These are still available to members at the price of 25/-.

All four parts of the Proceedings for 1970 were distributed before the end of the year. Council congratulates the Editor on thus completing the process of catching up, which he began in 1969. Council gratefully acknowledges the receipt of a grant of £75 from the Royal Society, mainly in respect of the papers on 'A Biological Study of *Aricia artaxerxes* ssp. *salmacis* (Stephens)', and on 'Homoeosis and related phenomena in the Small Copper Butterfly, *Lycaena phœbe* (L.)'.

Mr. C. N. Hawkins, a distinguished Special Life Member, died in February. He bequeathed to the Society £100 to be used for such general purposes as the Council might direct. It has been added to the Housing Fund.

The Centenary Committee has been actively considering plans for 1972. A welcome flow of gifts to the Centenary Fund has continued. The Council particularly wishes to acknowledge the gift by Mr. E. W. Classey of back-numbers of entomological journals. The sale of these to members has already provided a considerable addition to the Fund.

The Council and the Society have suffered heavy loss by the illness and, death at the end of June, of the Hon. Secretary, Mr. D. A. Odd, who in his short tenure of the office had made several improvements in the Society's administration. During the remainder of the year, the Society has been without a Secretary, the work being shared mainly between Mr. R. F. Bretherton, Mr. B. Goater, and Mr. F. T. Vallins. The Council is pleased, however, to nominate Mr. P. J. Baker to this rather onerous post for the forthcoming year, and wishes him all success.

The success of the Society depends entirely on the help which is so generously given by a great number of members, both office-holders and others. The Council wishes to thank all of them. It hopes that in the coming year, even more may take part in the day-to-day running of the Society.

EDITOR'S REPORT 1970

We completed publication for the year under review by publishing part 4, late in November. With this part, we produced 126 pages, with 5 monochrome and 3 coloured plates, plus an index of 11 pages to the previous year's volume.

Among the papers published was another part of Mr. Haggett's 'Larvae of the British Lepidoptera not figured by Buckler', which was financed by Mrs. Margaret Mere's memorial fund to her late husband. With this, we have published as much of the work as Mr. G. M. Haggett has ready. He is working on the next pair of plates. The Society's thanks are once more due to Mrs. Mere who has made this possible; Mr. Haggett joins us with his personal appreciation.

Also published was a paper by Mr. S. R. Bowden on the speciation of *Pieris napi* L.; a review of the microlepidoptera added to the British list since L. T.

Ford's review 21 years ago; and another part to the West African larvae series, among others.

In part 2 we published a coloured plate to the paper by T. S. Robertson, (1969, *Proc. Brit. ent. nat. Hist. Soc.*, 2: 76-102). This plate was printed and supplied to us by Shell Research Ltd. Our thanks are due to them for their generosity.

It is expected that we shall publish the index to the volume for 1970 with Part 1 of Volume 4 during February.

LIBRARIAN'S REPORT 1970

I am pleased to report a satisfactory year for the library, during which a record number of books were borrowed and several interesting gifts were received. An important and increasingly used part of the library is that containing the notebooks. We were, therefore, very pleased to receive from Frau Hering the notebooks and papers belonging to her late husband, the distinguished dipterist. These comprise several large parcels, which now need to be catalogued. Several hundred record cards containing details of the capture of his British Coleoptera were donated to the Society by Mr. R. O. S. Clarke. Valuable separates have also been presented.

During the year, our binders have bound ten volumes of our serial publications, including our own journal. We are now up-to-date with the popular ones. It is regrettable that the binders have increased their charges by 15 per cent, with a further increase likely in 1971. It appears, however, that our present binders' charges are in line with those of other firms.

The Maidstone Museum borrowed many of our British Journals to assist them in compiling the new list of Kent Coleoptera. These have now been returned.

Mr. R. M. Williams resigned as Assistant Librarian during the year and his position taken by Miss B. A. Spark, and I am grateful to both for their assistance. Mr. G. S. E. Cross has also been of great help in arranging our unbound foreign journals.

The additions to the library are as follows: Brewer, Jo, *Wings in the Meadow*, presented by F. D. Buck and S. N. A. Jacobs (two copies); Hering, Erich M., *Bestimmungstabellen der Blattiminen von Europa einschließlich des Mittelmeerbekenns und der Kanarischen Inseln*, 3 volumes, presented by K. A. Spenser; Jewkes, John, Sawers, David and Stillerman, Richard, *The Sources of Invention*, presented by A. S. F. Rippon; Lever, R. J. A. W., *Pests of the Cocoanut Palm*, presented by S. N. A. Jacobs; Nash, T. A., *Africa's Bane the Tsetse*, presented by S. N. A. Jacobs; Spencer, K. A., (editor), *Letters on Leaf Miners* by Erich M. Hering, purchased.

CURATOR'S REPORT 1970

Mr. F. T. Vallins completed re-arranging the Society's collection of Microlepidoptera early in the year. This is accommodated in 25 drawers of Hill units. The nomenclature follows the revised edition of Kloet and Hincks' list of British Insects.

We are greatly indebted to Mr. Vallins for carrying out this onerous task so efficiently and quickly. We are also grateful to the Rev. D. J. L. Agassiz for making photostat copies of the list available.

Work has continued on the re-arrangement of the Hemiptera-Homoptera. Nine drawers have been completed; these represent over half the required number. The F. J. Coulson collection is being incorporated; the nomenclature follows the

latest Kloet and Hincks' list. When the opportunity has arisen, work has also continued on the Dr. A. M. Massee collection of British Coleoptera.

Mr. J. C. Felton has finished checking the identifications of our British Hymenoptera, and Mr. F. J. Chandler has continued to give valuable assistance with the Diptera. The collections of Coleoptera have been frequently consulted, and specimens were loaned to Dr. M. G. Morris, to Messrs. C. MacKechnie Jarvis, and S. A. Williams for critical examination. Mr. P. M. Hammond has studied the Scydmaenidae and Mr. R. D. Pope a section of the Coccinellidae.

During the year, one Hill unit has been purchased and our two microscopes have been placed on loan. Specimens from the Society's collection were exhibited at the Annual Exhibition and the School's Natural History Society Exhibition.

The residue of the Capt. R. A. Jackson collection of British Lepidoptera was presented to the Society by his son, Col. B. W. Jackson. This very considerable number of specimens in immaculate condition is a valuable addition for which we are most grateful.

The thanks of the Society are also due to the following members for notable accessions: Sir Eric Ansorge (Lepidoptera), Mr. S. M. Atkins (Lepidoptera), Mr. A. E. Gardner (Coleoptera and Lepidoptera), Mr. B. Goater (Diptera and Lepidoptera), Mr. D. O'Keeffe (Lepidoptera), Mr. P. A. Selden (Lepidoptera), Mr. F. T. Vallins (Lepidoptera), Mr. S. Wakely (Lepidoptera), Mr. A. J. Wightman (Lepidoptera), and Mr. S. A. Williams (Coleoptera).

My best thanks are due to my assistant Mr. L. Christie for his continued valuable help.

TREASURER'S REPORT FOR 1970

Our auditors, Mr. A. G. Stoughton-Harris and Mr. J. L. Messenger, have approved the accounts for 1970. As there has not been time to circulate copies, I will briefly mention the main points.

On the assets side of the Balance Sheet, our investments, valued at cost, have risen to £5,784 as a result of the purchase last January, at a cost of about £2,300, of securities for the Hering Memorial Research Fund and for the General Fund. Share prices generally have had a bad year, and the market value of our older holdings was somewhat lower at the end of the year than at the beginning, though still well above cost. The new purchases, however, which were nearly evenly divided between equities and redeemable fixed interest stocks, almost exactly retained their market value. Cash at the bank was, of course, reduced by these purchases, but our balances on current and savings accounts together still stand at £1,279, which is a very strong position. Sundry debtors have increased, mainly because of a larger claim on the Inland Revenue. The process of writing off old stocks of Christmas cards and ties, which was begun in 1968, is nearing completion: the remainders now stand at £30 and £15 respectively.

On the liabilities side, the Housing Fund has been increased by the allocation to it of £100 bequeathed to the Society by our late Special Life Member, Mr. C. N. Hawkins, and of £50 from interest. It now stands at £1,046—still some way from enough to buy us a house. The Centenary Fund has risen during the year by £166, to £438; of this increase £51 has come from the sale of old periodicals generously presented by Mr. E. W. Classey, £92 from cash gifts, and the rest from interest. The balance of the Library Fund has been slightly reduced. The Hering Memorial Research Fund has not yet had a full year's income from its investments, but provision has been made in the accounts for an award of £100 from it, which has not yet been taken up. The Reserve Fund has gained £42 in

British Entomological and Natural History Society Statement of Accounts

BALANCE SHEET—31st DECEMBER, 1970

British Entomological and Natural History Society Statement of Accounts

PROC. BRIT. ENT. NAT. HIST. SOC., 1971

PUBLICATIONS ACCOUNT

		1969	1970	1969	1970
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
631 10 0	To Printing Proceedings for 1970	..	621 0 0	119 6 10	By Sales of Proceedings
28 12 0	Exhibition Report 1968	..	..	75 0 0	Donations (transfer from Reserve Fund)
— — —	List of Members and Addresses	..	13 10 8	— — —	Grant from The Royal Society
125 4 11	Blocks	..	102 19 6	526 9 10	Unused provision in previous year's Accounts
25 0 0	Plates—Callimorpha jacobeae L.	..	..	— — —	Grant from General Income and
46 3 2	Postages	..	33 11 8	470 13 7	Expenditure Account
335 10 2	Unused balance of donation, transferred to Reserve Fund	..	— — —	— — —	363 12 2
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
£1192 0 3			£771 1 10		£771 1 10
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

CHRISTMAS CARDS ACCOUNT

		1969	1970	1969	1970
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
80 0 0	To Stock at 1st January	..	56 0 0	86 4 7	By Sales
49 17 6	Printing and Envelopes	..	58 10 5	56 0 0	Stock at 31st December
6 0 1	Blocks	..	6 14 9	— — —	Stocks of cards printed after 1967 have been
2 15 0	Postages	..	7 1 0	— — —	excluded from the valuation.
15 6	Cost of Notice Sheets	..	— — —	— — —	
2 16 6	Income and Expenditure Account—Profit	..	3 0 5	— — —	
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
£142 4 7			£131 6 7		£142 4 7
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

TIES ACCOUNT

		1969	1970	1969	1970
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
60 0 0	To stock at 1st January	..	32 10 0	23 1 0	By Receipts from Sales
— — —	Debtors	..	3 15 0	3 15 0	Outstanding
4 0 0	Purchase of 12 dozen ties	..	127 0 0	32 10 0	Stock at 31st December
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
64 0 0			£163 6 0	£64 0 0	Income and Expenditure Account—Charge 120 14 0
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>

Stocks of ties purchased after 1967 have been excluded from the valuation.

British Entomological and Natural History Society Statement of Accounts

GENERAL INCOME AND EXPENDITURE ACCOUNT

EXPENDITURE			INCOME		
1969	£ s.	d.	1970	£ s.	d.
286 0 0	Rent	..	286 0 0	Subscriptions	..
12 15 9	Insurance	..	12 0 6	Interest on Investments	..
34 18 2	Secretarial Expenses	..	50 18 1	Interest on Bank Savings Account	..
5 10 5	Editorial Expenses	..	3 12 0	Sale of Cabinet	..
16 13 7	Treasurer's and Assistant Treasurer's Expenses	..	16 10 5	Bequest	..
80 13 5	Stationery	..	56 2 10	Christmas Cards Account—profit	..
16 15 0	Subscriptions to Societies	..	16 10 0	Annual Dinner	..
14 0 6	Lectures and Exhibitions	..	19 11 0	— — —	..
73 19 4	Cabinets and Collections	..	46 1 6	— — —	..
— — —	Conservation Year expenditure	..	59 0 0	— — —	..
— — —	Miscellaneous	..	363 12 2	— — —	..
470 13 7	Publications Account	..	120 14 0	— — —	..
4 14 0	Ties Account—charge	..	—	—	..
7 0	Annual Dinner—loss	..	10 2	—	..
10 0	Bank Charges	..	—	—	..
50 0 0	Housing Fund—interest	..	—	—	..
99 10 0	bequest	..	transferred and	—	..
5 0 0	Reserve Fund—interest transferred	..	150 0 0	—	..
— — —	Centenary Fund—interest transferred	..	41 11 9	—	..
— — —	Herring Memorial Research Fund—interest transferred	..	18 10 0	—	..
1172 0 9	Excess of Income over Expenditure	..	82 0 8	—	..
158 1 4	Excess of Income over Expenditure	..	1377 15 1	—	..
£1330 2 1			173 10 5	—	..
£1330 2 1			£1551 5 6	—	..
				£1551 5 6	..

We certify that the Balance Sheet and General Income and Expenditure Account are in accordance with the books and vouchers presented to us.

J. L. MESSENGER
A. G. STOUGHTON-HARRIS, F.C.A., Chartered Accountant.

R. F. BRETHERTON, Hon Treasurer.

interest, but has been reduced by the transfer to the Publications Account of £146 from the balance of Mrs. Mere's gift for publication of plates of the larvae of British Lepidoptera, a further instalment of which appeared in the 1970 Proceedings; over £200 still remains for use in future years.

Finally, the balance of the General Fund has been again increased by a surplus on the General Income and Expenditure Account. At £174, this is much better than I budgeted for last spring; and it has been secured after covering a large grant to the Ties Account for the purchase of new stock and also a non-recurrent item of £59 for publicity during Conservation Year. The surplus is mainly the result of a reduction of £107 in the grant needed by the Publications Account, and of a rise of £44 in subscriptions, which reflects a welcome resumption of the growth in membership; our administrative expenses are also slightly down. This is due to careful planning by many officers to avoid unnecessary expenditure and to keep costs down. I am very grateful to them for this.

Of the special accounts, the Publications Account shows, as I have said, a much reduced deficit. Some of this reduction is apparent rather than real, in that we have this year covered much of the cost of one part of the Proceedings by drawing part of Mrs. Mere's gift from reserve. We have also benefited from a grant of £75 from the Royal Society and from a useful increase in sales, which reflects a growing appreciation of the quality of our publications. Finally, the Editor is to be congratulated on some determined operations to keep down the costs of printing and blocks. Christmas Cards have had another good year. Altogether, Miss Brookes and her helpers sold about 3,800 cards of all vintages, and receipts exceeded expenditure in the year by £29, which was more than enough to cover the writing down of old stocks. The Ties Account has to carry the cost of a new stock of the maroon and green colours, which only arrived in September, and I hope that in 1971 we can make rather better arrangements for selling them to members.

All in all, we have had a very good year financially. I do not expect quite the same success in 1971. In 1970, by good luck and good management, we have been insulated from the current inflation. That cannot go on indefinitely; printing and postage costs must rise sharply in 1971. But the growth in membership is very helpful, and if we can keep this up we shall not come to much harm.

I have again had meticulous support from Mr. F. T. Vallins as Assistant Treasurer in charge of subscriptions, and I am very sorry that owing to his recent illness he cannot be here tonight. I also thank the auditors for the promptitude with which they have dealt with the accounts, and I am grateful for the help I have received from Mr. S. N. A. Jacobs, Mr. J. L. Messenger, Mr. J. A. C. Greenwood, and Mr. A. S. Wheeler, as Trustees and as members of the Finance Committee.

REPORT ON THE PROFESSOR HERING MEMORIAL RESEARCH FUND, 1970

At its February meeting Council appointed a Management Committee for the Fund, consisting of the President, Dr. B. J. MacNulty (*ex officio*); the Hon. Treasurer, Mr. R. F. Bretherton (*ex officio*); Capt. J. Ellerton and Dr. K. A. Spencer. At a Special Meeting held on 23rd April the Society adopted regulations for the government of the Fund. These were published in the Proceedings and Transactions, vol. 3, part 3, pages 93-4.

An announcement setting out the conditions for awards from the Fund, and inviting applications not later than 30th September 1970, was published during

the summer in five British entomological journals. Six applications were received, one of them after the closing date, for assistance towards the cost of publication of colour plates illustrating lepidopterous diseases of lemon trees; for a visit from abroad to study the taxonomy of certain Diptera in the British Museum (Nat. Hist.); for the purchase by the Society for long loan of books on leaf-miners; for research into the effects of temperature on pigmentation in *Precis octavia* (Lep., Nymphalidae); for the study by trap sampling of the distribution of certain micro-lepidoptera in various parts of North Wales; and for the compilation of lists of Rhopalocera and Heterocera to be found in a Sussex nature reserve.

After considering the applications in relation to the priorities set out in the announcement of the purposes of the Fund, the Management Committee on 1st October offered an award of £100 to Mr. Hugo Andersson, of the Zoological Institute, Lund, Sweden, towards the cost of a visit to London for the purpose of studying the collections of Indian and African Chloropidae in the British Museum Natural History, as a sequel to field studies of this group of insects. Mr. Andersson has accepted the award, and hopes to make the visit about April, 1971.

It is intended that applications for awards in 1971 should be invited early in the summer.

11th FEBRUARY 1971

The President, Col. A. M. EMMET, in the Chair

The death was announced of Mr. A. J. Wightman.

EXHIBITS

Mr. S. A. WILLIAMS—*Ocyphus olens* (Müll.) from Darent Wood, Kent, 31.iii.65 and *Oligota flavicornis* (Lac.) (Col., Staphylindae), to illustrate the great difference in size found in the family.

Mr. A. E. GARDNER—(1) *Deleaster dichrous* (Grav.) (Col., Staphylinidae) from the Coulson Collection, a rare species found in association with the nests of the water vole and also under leaves in damp situations. (2) A short series of *Micralymma marinum* (Stroem.) (Col., Staphylinidae) taken in the fissures of rocks below the high-water mark at Spalrick Bay, I.o.M., 10.viii.69. At high tide these rocks are covered by two or three fathoms of water.

COMMUNICATIONS

A doubt was expressed by Mr. F. D. BUCK on the specific association of *Deleaster dichrous* (Grav.) and the water vole. He had seen the insect in gravel on the beach at St. Margaret's Bay, Kent; a most unlikely habitat for a water vole. The paucity of records for this beetle was hardly conducive to any firm conclusions regarding its habitat except that it favoured a damp situation.

Mr. T. G. HAWORTH announced that he had obtained for the Society from the Rank Organisation, a copy of the film 'Where have all the Butterflies gone', in which a number of our members had taken part.

Mr. S. A. WILLIAMS read a paper on 'Rove Beetles' which he illustrated with coloured transparencies. The paper was followed by a discussion.

25th FEBRUARY 1971

The President, Col. A. M. EMMET, in the Chair

The following new members were declared elected: Mr. R. T. Mew and Mr. A. J. Fairclough.

EXHIBITS

Col. A. M. EMMET—Shoots of spruce (*Picea abies* (L.) Karst.) showing vacated and tenanted mines of *Blastotere glabrella* Zell. (Lep., Yponomeutidae), or less probably, *B. illuminatella* Zell., from Debden. in Essex. Either species would be a new county record.

Mr. C. O. HAMMOND—A stereo slide of a *Nymphalis antiopa* L. (Lep., Nymphalidae) taken with a Pentax stereo-beamsplitter accessory screwed onto a standard 55mm lens; viewed through the Pentax mirror viewer.

Mr. J. A. C. GREENWOOD—An enlargement of a photograph of an *Aglais urticae* L. (Lep., Nymphalidae) taken by Col. Scott.

COMMUNICATIONS

Commenting on the season, Dr. C. G. M. DE WORMS said he had seen recently some *Achyla flavigornis* L. (Lep., Thyatiridae), some *Conistra vacinii* L. (Lep., Noctuidae) and a few species of *Orthosia*. Some spring moths, he added, were as much as two or three weeks early.

A discussion on 'Insect Photography' was opened by Mr. M. W. F. Tweedie, who followed his remarks with a number of coloured transparencies by way of illustration. The following members also took part in the discussion and showed examples of their work: Mr. E. S. Bradford, Mr. D. Goddard, Mr. C. O. Hammond, Mrs. F. M. Murphy, and Mr. R. W. J. Uffen.

11th MARCH 1971

The President, Col. A. M. EMMET, in the Chair

The President welcomed Mr. and Mrs. Heinemann, from New York, to the meeting.

EXHIBITS

Col. A. M. EMMET—The grass *Dactylis glomerata* L., growing in a pot and mined by *Elachista unifasciata* (Lep., Elachistidae), which mined in a peculiar manner for the genus. The mine is rather like that of a *Lithoclellis*, the larva spins silk inside the blade of the grass causing it to pucker and form a sort of tube. The exhibited insects were taken on the North Downs at Featherbed Lane on the Surrey/Kent border.

Dr. K. A. SPENCER—Agromyzid flies to illustrate his talk.

COMMUNICATIONS

A letter from C. E. M. Dale, a post graduate student of Manchester University, was read. He requested help with specimens of *Noctua pronuba* L. (Lep., Noctuidae) for ecological and genetical research.

A talk on 'Agromyzidae' was given by Dr. K. A. SPENCER, which he illustrated with coloured transparencies and diagrammatic slides.

BOOK REVIEWS

A Field Guide to the Butterflies of Britain and Europe. By Lionel G. Higgins and Norman D. Riley, with colour illustrations by Brian Hargreaves. 380 pp. + 60 colour plates, 371 distribution maps, end papers. Collins 1970. 42s.

This book is the first comprehensive guide, with colour illustrations, to the European butterflies. It is the culmination of the combined experience, both in the field and in the museum, of two authors who need no introduction.

The format is excellent and comprises a chapter on how to use the book, introduction, check-list of species, glossary, descriptive text, bibliography, and distribution maps. The layout of the text is both lucid and concise, the authors having reduced the descriptions to a minimum, obviously relying a great deal upon the excellent and well reproduced illustrations of the artist, Brian Hargreaves. The scientific and English names are followed, where possible, by the common names in French, German, Swedish and Spanish. Then follows the world range of the species, scientific name, author and date, type locality, the condensed description, flight (time of appearance), habitat, distribution, variation, and the names of similar species. The habitat section includes notes on the larval foodplants, when known. Of special value are the key characters that are to be found on the caption pages opposite the plates. The end papers will be very useful and should enable the beginner to place any specimen at family level without much difficulty.

A very sensible and objective view is taken in dealing with the vast number of subspecies which in a volume of this size, could not be dealt with adequately, and only what are termed the 'major subspecies' are accounted for. This objective approach to the subspecies or geographical races will no doubt cause considerable controversy, however, as will the 'lumping' together of taxa which have generally been accepted as distinct species, e.g. *Melanargia galathea* and *lachesis*, and *Pieris napi* and *bryoniae*. It is assumed that these and other changes in nomenclature which, to quote the authors (p. 13), 'we hope are final', are new and appear for the first time in this book; if this is so it is unfortunate and, in the opinion of the reviewer, should not have been made in such a general textbook. This kind of information should be published as a separate paper in one of the entomological journals devoted to such literature.

It is pleasing to find that the European Mapping Scheme is mentioned, the record cards for the European butterflies having been based on the check-list in this book. The check-list in its present form, however, serves no useful purpose for neither authors and dates nor synonymy are included.

The beginner will find the glossary extremely useful, in spite of the typographical errors—'hononym' for homonym, 'image' for imago and 'priform' for piriform. The definition of homonym is not clear, and the statement under synonym that 'only the first published name is valid' I find amusing when in the past such a large number of valid names have been suppressed by taxonomists in favour of better-known junior synonyms, merely to satisfy personal whims.

I found the abbreviations in the descriptive text somewhat annoying at first but these can be mastered very quickly and without undue stress.

The introduction is both interesting and explanatory. It is stated, however, that the gland cells at the base of the androconia produce scents which are believed to be attractive to the females, i.e., implying that they are directive. I would have thought that the scent produced in such gland cells in the male is of an aphrodisiac nature and stimulates the female to copulate.

In the citation of the scientific names I found the absence of a comma between the author and date irritating. I condone, however, the absence of brackets around authors; although their inclusion where necessary conforms with the Zoological Code, they serve very little purpose in nomenclature.

The distribution maps, although necessarily small, show at a glance the breeding range of each species. The order of the maps would have been better if the species had been so arranged that one read the captions from top to bottom instead of across the page.

Two indexes are provided, one of English names and one of the scientific names. That of the English names is usable in spite of not being completely cross-referenced; that of the scientific names is of very little use for, apart from a lack of cross-referencing, the species' names are merely arranged alphabetically under their respective genera. While such a system may well work after the reader has learnt the generic and specific combinations, it is at present almost impossible to find a given species if it has been placed in an unfamiliar genus. It is to be hoped that future editions will incorporate a fully comprehensive index.

The book is marred by the number of typographical errors, one such error even occurring on the spine, and the quality of type-setting does not come up to the usually high standard that one associates with the publishers.

It is a pity that a small paragraph on conservation was not included in the introduction, especially as this book was launched in European Conservation Year.

In spite of these minor criticisms I cannot praise the book too highly. The professional approach combined with the easy-to-read text and excellent illustrations will no doubt make this book one of the best sellers of its kind for many years. It is a book that anyone interested in natural history should possess let alone collectors and more serious students of butterflies. At such a modest price it is one that all can afford. My congratulations to the authors, artist and publishers.

W. G. TREMEWAN.

Beetles in Merioneth. Since the publication of 'A Preliminary List of the Coleoptera of Merioneth, North Wales' (Skidmore and Johnson, 1969, *Ent. Gaz.*, 20:139-225), a number of records from this county have been brought to the notice of the authors. It was suggested that I should bring all these together in the form of a supplement to their paper.

Before I complete this I should be glad to receive any further information from other collectors who did not know that the first list was being prepared. Observations made by visiting entomologists on holiday in Wales are not always published and interesting records may be lost.

Additional information on the beetles of the eastern half of the county would be particularly welcome; and, to quote Skidmore and Johnson, 'there is a dearth of records for indoor species and pests of stored food products'.—Mrs. M. J. MORGAN, University College of North Wales, Dept. of Agriculture and Forest Zoology, Memorial Buildings, Bangor, Caernarvonshire, 14th August 1970.

PRESIDENTIAL ADDRESS

B. J. MACNULTY, PH.D., B.Sc., F.R.I.C., F.L.S., F.R.E.S.

I first attended a meeting of this society at the Annual Meeting 40 years ago, joining the same year (1931). The membership was then 251; it now stands at 600, or an average annual increase of six per cent. However the growth has not been steady, but static, except for two short periods, one just after the war, when membership doubled, and about 1960 when another 100 members were added. If we could only maintain a six per cent annual increase in membership any future financial troubles would be overcome. What this society needs for a secure future, is a membership of 1,000. As an example of what can be done I should mention Mr. A. D. A. Russwurm, who for many years has introduced two or three new members to the society annually. I thank him on your behalf for the effort he has made over the years.

In 1931 the average attendance at meetings was 37. The average for 1970 is scarcely larger. Hence our attendances have not kept up with our increase in membership. However in 1931 we had 208 ordinary members, and today 275, which perhaps reflects our transition from a local to a national society, but the annual increase is less than one per cent. There is room for improvement here. Subscriptions increased fourfold in the period from 12/6d to £2.12.6, but are still remarkably cheap for a national society.

One further change, in 1931 we held 11 field meetings compared with 28 this year. So the total attendance is probably as high as ever.

I thank the officers and members of the council both collectively and individually for the hard work they put in during the year. Administratively it has been a difficult period. Mr. Odd was taken ill in April and died in July after a short illness. His death was sudden, unexpected and a great loss to the society, and I must in particular thank Mr. Bretherton and Mr. Goater for keeping the secretaryship working during the rest of the year. I must thank also Mr. Baker for volunteering to take over the onerous but rewarding job of secretary.

During the year the society lost 8 members by death:

Mr. H. Symes, M.A. Oxon., joined the society in 1950. He was a keen lepidopterist and worked mostly in the Oxford district and the New Forest.

Mr. H. E. Webb, who died in February, joined the society in 1945 and for the next ten years was a most active member. He served six years on the council, was Field Meetings secretary in 1951 and 1952, and lanternist in 1955. After his retirement, failing eyesight led to his gradual disappearance from our meetings. I have very happy personal memories of him—he was a great asset to the society which is the poorer for his passing.

Mr. C. N. Hawkins, joined the society in 1924. In the thirties he was one of the most prominent amateur entomologists in the country. Alone and in collaboration with his great friend Dr. E. A. Cockayne, he started a series of researches on the pupal development of British Lepidoptera, much of which appeared in our Proceedings. He greatly missed his collaboration with Cockayne which ceased owing to the war and transferred his interest to Coleoptera. After the war he continued his frequent attendance at our meetings until some five years before his death, when he suffered greatly from illness. He was President of the society in 1930 and served many times on the Council. A solicitor's clerk in private life, his legal help to the society was invaluable. In the thirties one of the great services to the society was the nurturing of young entomologists which Hawkins and Cockayne made their metier. They gave freely many hours after

meetings teaching us the elements of our knowledge. We do not seem to have their like today.

Mr. A. E. Curtis, joined in 1937, but rarely attended meetings. He was a lepidopterist and specialised in the *Eupithecia* most of which he succeeded in breeding.

Mr. I. R. P. Heslop, joined the society in the same year as myself. He was for many years a District Officer in Nigeria. He will be remembered for the Check List of British Lepidoptera, and his book on the Purple Emperor butterfly.

Mr. D. A. Odd, who joined in 1938, died in July whilst secretary and his cheerful and forceful presence at Council meetings was greatly missed as was his efficient administrative service. By his death the society has lost a very able worker from whom we had hoped to have many years of faithful service.

Mr. T. Trought, who died last April, joined the society in 1950. A Warwickshire country member, he did not attend many meetings.

Mr. W. J. C. Tonge, did not join the society until 1968 and died in June 1970, so he was a member for only two years.

Since this has been European Conservation Year, I must add a few words on Conservation. Conservation already means hands off—a negative solution; which unfortunately appears to work in the short term with birds and animals, because hunting is what threatens so many dwindling species. Proper conservation is maintenance of environment. Protection, particularly of micro-environment, is needed and this means the encouragement of very very careful study of all aspects of existence, the effect of change and the necessary reasonable collecting that must go with it. Even the slightest upset to the environment can do untold damage; myxomatosis removed the rabbit; and now our chalk Downs, once vast reserve sheep cropping areas and the source of much of our more interesting fauna and flora, are well on the way to becoming hawthorn and bramble jungles.

We know far too little about the full life histories and inter-relationships of most of the invertebrates. Future entomologists will have to spend much more time on field studies to elucidate such factors if we are to know how to conserve, and this society, as the premier field society in the country, should lead in this work.

Much land that is given to conservation is useless or an incumbrance to the owners. Rarely is there any money to conserve the area, and the public I fear are only in favour of conserving prettiness and then only at no inconvenience or cost to themselves. Finally there is a great danger that Conservation will be caught up in the anti-pollution campaign, and true conservation lost because prevention of pollution will be considered sufficient.

AN INTRODUCTION TO THE STUDY OF ACARI-INSECTA ASSOCIATIONS

Three years ago, I found at Loch Rannoch in a *Boletus* about 30 *Bolitophagus reticulatus* (L.) (Col. Tenebrionidae) all infested with mites. Each mite was beetle shaped and fitted into one of the reticular impressions of the elytra or head. As a result I recalled that in the past *Polyommatus icarus* Rott. and *Maniola jurtina* L. not infrequently bore red mites and were often heavily infested, and that I had not noticed such infestations recently. A search for infestations on these butterflies was negative, and it was two years before three infested specimens of *Melanargia galathea* L. were received from Dunstable downs, but I still cannot find any infested *M. jurtina* or *P. icarus*.

Meanwhile I searched popular literature for mention of mites on insects. Neither Ford^{1, 2} nor Imms³ refer to Acari but Imms mentions that *Geotrupes* often carry mites. Although Butler⁴ mentions the acarine disease of the honey bee, he gives no details. Free & Butler⁵ referring to bumble bees give several interesting references. Lucas⁶ quoting McLachlan, says red mites occur on the wings of *Sympetrum striolatum* (Charp), but McLachlan refers to mites on *Sympetrum mexidionale* (Selys)⁶ as well as on *S. striolatum*^{7, 8}. Corbet⁹ refers to the larval stage of a mite on dragonflies and Longfield¹⁰ mentions a red mite on legs of the same group of insects, but it is not clear whether they refer to the same mite. For Diptera, Colyer & Hammond¹¹ record that mites attack *Asilidae*, associate with *Sphaeroceridae* and *Scatophagidae* and that *Cecidomyiidae* are predatory on mites.

This preliminary research indicated that mites associate quite widely with insects and field observations soon indicated how very little we know about these interesting associations, and led me to a serious search of the literature.

CLASSIFICATION AND STRUCTURE OF ACARI

Any study of mites associating with insects requires sufficient knowledge of their structure to enable specimens to be classified if not identified, and to enable the mites to be distinguished from other small invertebrates.

Mites¹² belong to the Phylum *Arthropoda* Sub-phylum *Cheliceraata* Class *Arachnida* Sub-class *Acari*. There are two super orders, *Acari-anactinochaeta* and *Acari-actinochaeta*. The first has setae all of which are isotropic, the latter have some setae which are anisotropic and therefore birefringent.

The evolutionary development of mites has resulted in a different number of segments to the body, and to a different arrangement of these parts and their names to that used in the Insecta. The body of the mite is divided into four parts¹² (Fig. 1): (a) The oral opening and mouth parts are known as the *gnathosoma*; (b) The region of the pairs of legs I and II, the *propodosoma*; (c) the region of the pairs of legs III and IV, the *metapodosoma*; and (d) the posterior region, the *opisthosoma*. The propodosoma and the metapodosoma together form the *podosoma*. The metapodosoma and the opisthosoma together make up the *hysterosoma*. The whole body minus the gnathosoma is the *idiosoma*. Wharton and Baker¹³ include two other sections, the *prosoma* comprising the whole body minus the opisthosoma, and the *proterosoma* comprising the gnaphthosoma and propodosoma. Just behind the fourth pair of legs between the metapodosoma and the opisthosoma the mite is sometimes narrowed.

It is outside the scope of this paper to go more closely into the structure of mites, but I must draw attention to the gnathosoma which is used to separate the seven orders. The Notostigmata inhabit the Mediterranean basin, Central Asia and N. and S. America. The Tetrastigmata have been found in the islands of the Indian Ocean, New Guinea, Australia and New Zealand. Neither order has been found in the British Isles. The remaining five orders may be distinguished as follows:

1. METASTIGMATA Gnathosoma with a barbed hypostome (this is the end of the pedipalpal coxae). (Fig. 2).
2. MESOSTIGMATA Pedipalpal apotele represented as a tined setae-like structure plus a tectum to the gnathosoma. (Fig. 3)
3. ASTIGMATA Pedipalps small, two-segmented, and pressed to infra capitulum. (Fig. 4)

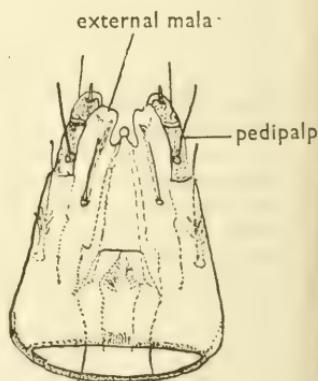
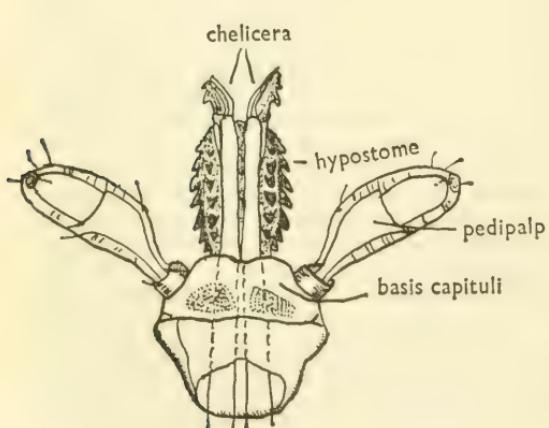
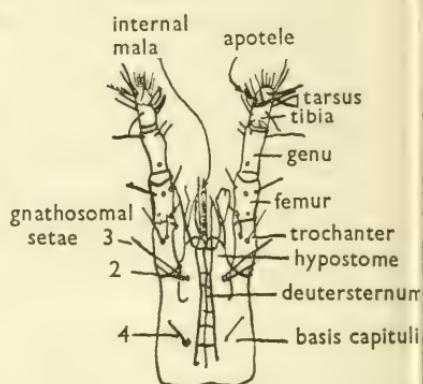
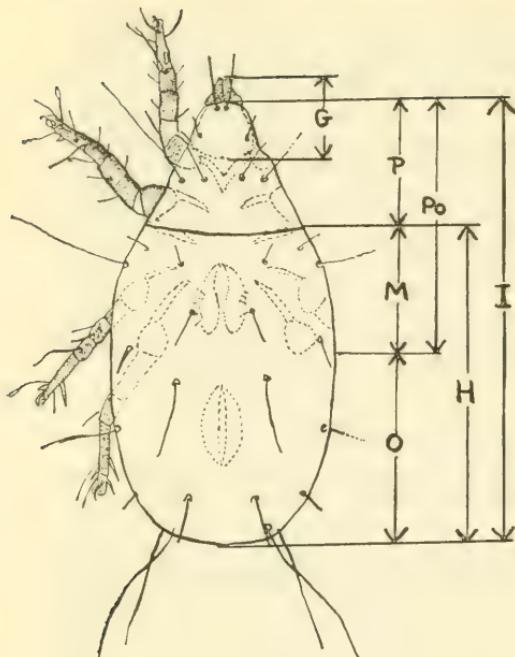


Fig. 1. Body of mite showing divisions: G=Gnathosoma; Po=Podosoma; P=Propodosoma; H=Hysterosoma; M=Metapodosoma; I=Idiosoma; O=Opisthosoma.

Fig. 2. Gnathosoma of Metastigmata.

Fig. 3. Gnathosoma of Mesostigmata.

Fig. 4. Gnathosoma of Astigmata

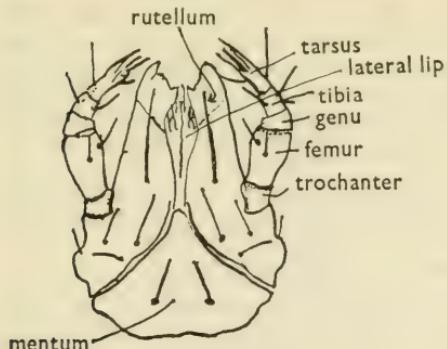
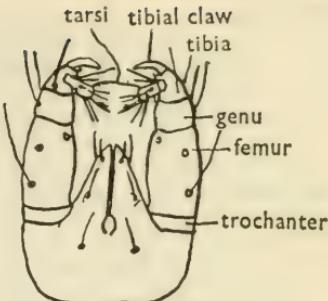


Fig. 5. Gnathosoma of *Cryptostigmata*.
Fig. 6. Gnathosoma of *Prostigmata*.



4. CRYPTOSTIGMATA Gnathosoma with conspicuous rutella (setae) and chelicerae chelate and dentate. Pedipalps 3-5-segmented. (Fig. 5)
5. PROSTIGMATA Gnathosoma without rutella, chelicerae rarely chelate-dentate. Pedipalps 3-5-segmented. (Fig. 6)

LIFE HISTORIES

The details of life histories of most mites are still unknown. The basic pattern is known but individual histories can be complex with considerable reaction to the environment. Under favourable conditions the life cycle may be short but in adverse ones additional stages of development may occur with one or more diapauses which can last until conditions change. Mating behaviour is similar to that of Arachnida and as versatile. Both Arrenotoky and Thelytoky occur and ordinary biparental mating also. Many species practise all three methods of reproduction depending on circumstances. Arrenotokous males can mate with the mother and do.

In some, if not all, mites biparental offspring are always females.

The general life cycle which may vary is: The egg is laid by the female, and from it hatches the hexapod larva which, after feeding, goes through a pupal stage, and then the three morphologically different nymphal stages, protonymph, deutonymph and tritonymph, followed by adults. However, there is much variation and some nymphal stages are replaced by pupae. Long diapauses often occur.

- MESOSTIGMATA There are usually four active stages, larva, protonymph, deutonymph and adult. Ovoviviparity occurs in some species. (Certain Uropodina produce a phoretic nymph.)
- METASTIGMATA Have only a larval, one nymphal stage and an adult; but in some moulting occurs and the nymph may have as many as eight instars.
- CRYPTOSTIGMATA Seems the most normal order, with four active immature stages, larva, proto, deuto, and tritonymph.

PROSTIGMATA

In this order four different types of life cycle occur. Only larval and adult stages follow the egg in the *Tarsonemina*. (It is suggested that nymphal stages are passed within the larval skin.) The *Parasitengona* have a larva and one active nymph, whereas the *Tetranychoidae* have a larval and two nymphal stages. Many families have a full four-stage life history.

ASTIGMATA

May have the deutonymph missing, or it may be replaced by a non-feeding active or inactive hypopial stage.

THE ACARI-INSECTA ASSOCIATION

Some 12 years ago this society had a lecture on this subject by Dr. G. O. Evans,¹⁴ but no record, beyond the title, has survived. I have carried out an extensive literature search from 1885 to 1968. Prior to 1890 we are entering the dark ages as regards studies of the Acari, although there are a few records of associations with insects. Of the many references found, 25 relate to general association between Acari and Insecta.¹⁶⁻⁴¹ Most of the interesting work has come from America, Australia and the germanic areas of Europe, except for ants where, largely owing to the work of Donisthorpe, we seem to have held our own. There was a great interest in Acari on Insecta between 1900 and 1914. Subsequently the main interest was directed to the Acarine or Isle of Wight disease of honey bees; however, more general observation began to increase during the 30's until by 1950 there was, at any rate abroad, lively interest in the subject.

The usual explanation of the presence of mites on insects has been phoresy. Undoubtedly this is true at times but when really careful observation is made of an association a very close symbiotic relationship is often found.

HYMENOPTERA

1. *Genus Apis*. I start with honey bees because it was a disease in bees caused by a mite that encouraged study of the Acari by other than specialists. The mite *Acarapis woodii* Rennie (Fig. 7) invades the large trachea leading from the first thoracic spiracles. The fringe of hairs which protect the thoracic spiracles are flexible in newly emerged bees and only become hard and stiff and thus an effective barrier to mites after a few days, so that only bees less than nine days old are susceptible to infection. The female lays eggs in the tracheae, these produce larvae which feed on the haemolymph of that bee; they then moult to adults. The mites thus multiply extremely rapidly, and a partial blockage of the respiratory system occurs which together with the destruction of tissue severely weakens the bee and either results in death or renders it useless as a contributor to the general life of the hive. The mite can only live for a few hours in the absence of live bees. Since 1918 there has been a steady publication of papers on the subject.⁴²⁻⁸⁸

2. *Bees (other than Apidae) and Wasps*. The remainder of the Hymenoptera produce relatively small numbers of records,⁸⁹⁻¹²⁰ but many of the cases have been so well investigated that their importance more than makes up for their paucity. There are two types of association; mites that are found in the nests, and those that are truly parasitic on the inhabitants. The former must undergo a phoretic period on the hosts to get from one nest to another and many will transfer to flowers as part of their life history. Some of these species appear to be truly symbiotic.

The most interesting and best investigated of acari-insecta relationships are those between certain solitary wasps (*Eumenidae*) and mites (*Ensliniellidae*) and I

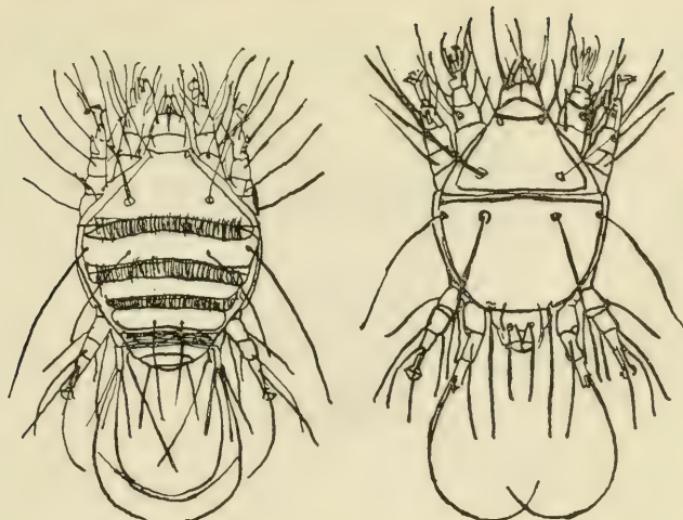


Fig. 7. *Acarapis woodii* Rennie. Cause of the Isle of Wight disease in bees.

quote one research to illustrate the methods used, and the surprising symbiotic behaviour revealed.

The Association between the Wasp *Ancistrocerus antilope* (Panzer) and the acarine mite *Ensliniella trisetosa* (Cooreman)

Many vespid wasps habitually harbour characteristic deutonymphs. Out of the possible acarine-wasp pairs, Cooper⁹⁷ chose the association of *Ensliniella trisetosa* Cooreman (Fig. 8) with the wasp *Ancistrocerus antilope* (Panzer) for his excellent study. The males bearing mites are common enough and have loads of up to three or four hundred mites. Females bearing mites are however much rarer and usually carry only four to six—or at the most 14 to 19 deutonymphs. The nymphs always occupy certain very well-defined areas on the wasp which are referred to as acarinaria.

The acarinarium is a term introduced by Roepke¹¹² whose meaning was extended, first by Bequaert¹¹¹ and later by Cooper,⁹⁷ to include any surface or anatomical feature of an insect, enclosed or not, external or internal, that regularly serves as an abode for mites. (In wasps and bees the first abdominal segment is fused with the metathorax becoming part of the notum and is called the propodeum.)

The propodeal acarinaria of the male wasp is indicated in Fig. 9. Laterally it extends over the shaded areas. The left-hand figure indicates the lateral part and the right hand the posterior acarinaria which are joined at the posterior end of the lateral acarinaria. The posterior one has a distinct and marked concavity ending in a deep pit above the valvula. Many wasps have an almost totally enclosed chamber. These areas are much smoother and the pubescence is short and decumbent whereas elsewhere the surface is coarsely punctured and the hairs are long and erect. The hairs on the acarinaria are streamlined towards the rear. The propodeal acarinaria of the female are similar to those of the male.

A careful survey showed that 83 per cent of the males carried deutonymphs on the propodea but only 12 per cent of the females. The maximum found on any

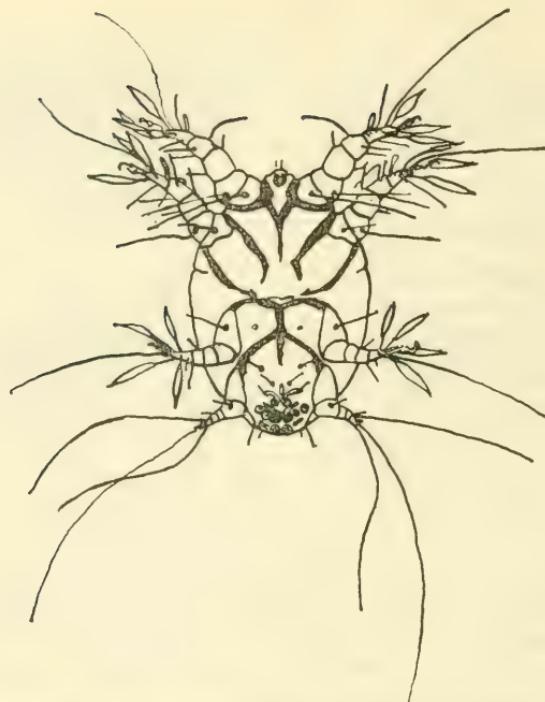


Fig. 8. The mite *Ensliniella trisetosa* Cooreman symbiont of the wasp *Ancistrocerus antilope*.

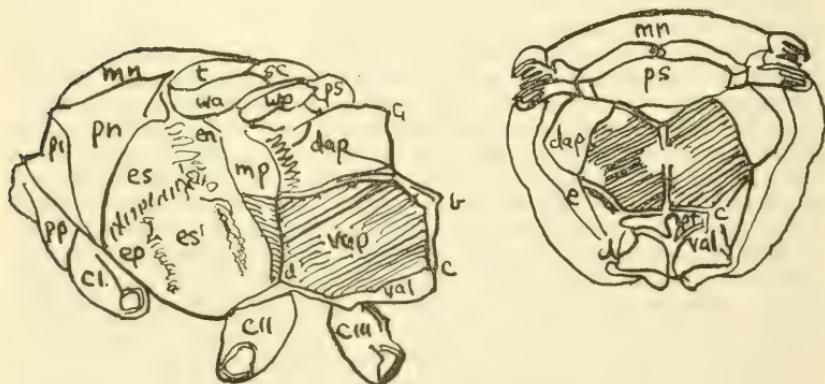


Fig. 9. Thorax of *A. antilope* showing propodeal acarinaria.

male was 400 with a mean of 134, whereas on the females the numbers were 19 and 4.3 respectively. The lateral acarinaria are always occupied first, and the mites are distributed equally on the left- and right-hand sides. When there are only a few mites the concavity is treated quite separately. Details of distribution and numbers of mites are given in Table 1. The packing of the mites depends on their numbers.

The posterior acarinarium is divided into two halves by a lengthways carina and when only a few deutonymphs are present each half is treated as a separate acarinarium. The method of packing depends on the number of mites present, *The Congenital Acarinarium of the male wasp*. A little known fact of the mite/wasp association, first recorded by Bequaert,¹⁰⁷ is that many deutonymphs are carried internally within the seventh abdominal segment. In *A. antilope* the deutonymphs carried internally are restricted to a broad shallow space between the combined internal surfaces of the eighth plus ninth sternites and the ventral surface of the phallus. The phallus and related musculature divides the chamber in two. In the male nearly all the mites are in the ventral chamber, where the maximum number found was 238, with a mean of about 37. The mites in the genital chamber can emerge only when the abdomen is opened.

Cooper showed by counting mites and assessing the age of the wasp from its condition that the following scheme was true for variation for load of deutonymph on male wasps.

Relative Age of Male Wasp	Change in Mite Load	Nature of Loading
Young	Loss of mites from total	Load of mites very large All on Propodeal acarinarium
Older	Loss of mites from total	Mite load less; both propodeal and Genital Acarinaria
Old	Loss of mites from total	Mite load small. Propodial load nil or very small. Genital chamber 95-100% loaded
Very Old	Loss of mites from total	No mites or a few lifeless ones in Ventral Genital Chamber

Male wasps start life with a large propodial load of deutonymphs which are transferred to the genital chamber during life and are finally totally lost.

Further investigations proved that the deutonymphs were not lost or transferred purely due to the passage of time, by mechanical disturbance, by the presence of other wasps, by overloading, or purely by opening of the genital chamber. (Checked by surgery.) Visits to flowers had no effect nor did any other stimulus.

Subsequently it was shown that male and female wasps are equally frequently infested, that young or newly emerged females carried no mites, whereas old ones normally have deutonymphs in the genital chamber, that no female has been found bearing large numbers of mites on propodeal acarinaria only, and it was possible to show the following conclusions, illustrated in Table I overleaf.

The major site of mites in the male is on the propodeal faces first, then in the ventral genital chamber. The major site in the females is the dorsal ventral chamber. Finally the deutonymphs in the female genital chamber seem to be

TABLE I
Distribution of mites on Acarinaria of *A. antilope*

Loading of Deutonymphs	Male Wasps			Female Wasps		
	Max	Mean	% Total Mites	Max	Mean	% of Total Mites
Total	407	158	100	135	45.3	100
Propodeal Faces	407	121	76.5±0.3	14	0.76	1.7±0.3
Posterior Face	130	30	19.0±0.3	10	0.06	0.1±0.07
Right Face	138	46	28.4±0.4	14	0.4	0.9±0.2
Left Face	139	45	28.9±0.4	10	0.3	0.7±0.2
Genital Chamber	226	37.4	23.6±0.3	132	44.6	98.3±0.3
Dorsal Chamber	23	0.7	0.4±0.04	131	40.5	89.3±0.7
Ventral Chamber	203	36.7	23.2±0.3	18	4.1	9.0±0.6

approaching ecdysis. Cooper concludes that the transfer occurs during mating and shows subsequently that this is so. Cooper states also that there is a mechanism by which in the nest mites are only released during egg laying onto cells in which male wasps are going to develop.

Finally Cooper gives a list of related wasps which also carry deutonymphs of mites, suggesting a similar relationship, and that just as the mite obviously depends on the wasp—the reverse is probably true also.

A similar case investigated by Cooreman and Crevecoeur,¹⁰⁴ is the association of the mite *Vidia concellaris* with the hymenopteron *Cerceris arenaria* L. The larva of *Vidia concellaris* eats the remains of the Curculionidae on which the wasp larvae feed, but only after the wasp larva has pupated outside the beetle. The deutonymph enters the nest or cell from the adult wasp and changes to the tritonymph and then to an adult whilst clinging to the legs of the paralysed Curculionidae, where the eggs are laid and hatch within 24–48 hours. The larvae feed on the beetle remains for two or three days, change into protonymphs, enter diapause within the beetle carcasses, and later change to deutonymphs, which remain dormant until the hymenopteron breaks out of the cocoon, when they swarm on to it and the cycle recommences. Thus 15 days are spent actively and about 11 months in diapause.

3. *Formicoidea* (Ants). The interest in ants at the turn of the century has resulted in more records of the association between mites and these insects^{121–174} than there are with any of the other Hymenoptera. In Britain Donisthorpe¹³³ lists 35 species of mites found with ants, occupying every possible type of relationship, but does not give any details of their life cycles, which seem to be largely unknown, although he had mites in observation nests. Many of the mites appear to be associated with only one or perhaps two species of ant.

DIPTERA

Many Diptera/mite associations are found in the literature,^{175–242} but few from British workers, nor are there any detailed investigations as to the nature of the association.

However, Greenberg¹⁷⁸ detects a definite pattern in the resting places of the hypopi of *Myianoetus muscarum* on the flies *Musca domestica* L., *Muscina stabulans* (Fall) and *Stomoxys calcitrans* L. He also showed that the mites are attracted by a volatile substance produced by and feed on the same material as the flies. On

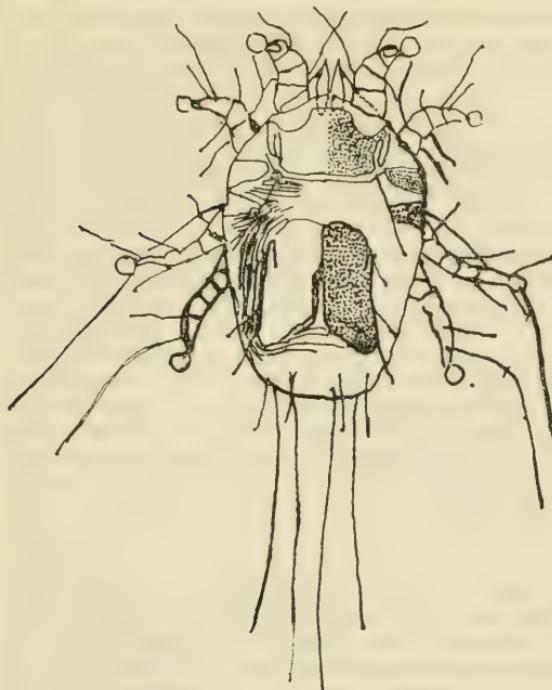


Fig. 10. The mite
Microlichus uncus
Vitzthum, parasitic
on Hippoboscid flies.

transfer from the fly to the feeding site, they are active for about two weeks, becoming trytonymphs after two days and adult one day later. Fully fed mites congregate at the posterior end of fly pupae until eclosion when the deutonymphs transfer to the emerging fly. Most mites remain with the fly and die there, even when opportunity to transfer to a food site occurs. Greenberg's notes suggest a phoretic relationship, but the behaviour seems so parallel to that of certain wasps that the relationship may be much closer than it appears.

There are also species of mites parasitic on the Hippoboscid flies^{177,203} which parasitise birds. These mites (Fig. 10) do not seem to breed unless they have fed on the flies, and a complex mite-fly-bird association seems likely.

ORTHOPTERA

Although the literature references²⁴³⁻²⁶² are relatively few, they are frequently more complete because the insects are often economic pests.

1. *Blattidae* Cockroaches are regularly attacked by mites.^{245, 248, 250, 252-254} Cunliffe²⁵² has studied the association of *Pimeliaphilus podapolipophagus* Trägårdh with *Blatella germanica* (L), and *Blatta orientalis* L. The mites are found in nearly any place frequented by cockroaches. The eggs are laid anywhere and hatch after eight to ten days. The larva is very fast moving and attaches itself to a cockroach as soon as possible. It feeds actively for four to six days, there is then a rest period of two to three days before the nymphal stage. The nymph lives for six or seven days after which it drops off the cockroach and pupates anywhere under debris. During this period of three or four days the mite is quite helpless. The adult lives for about three weeks and lays two or three batches of eggs.

Cunliffe proved that mites actually fed on the cockroach, and not on debris and particles attached to the cockroach, by using radioactively labelled food.

2. *Acrididae (Locusts and short-horned grasshoppers)* From the amount of research that has been carried out on locusts, it is not surprising that mites have been recorded on the insect and the outline life history is known fairly completely, at any rate, for one of the most widely distributed mites *Eutrombidium rostratus* (Scop.). The mass of eggs is laid usually in the soil; up to 5000 eggs can be laid over several weeks by a single female. Hatching occurs after two or three weeks and the larvae seek a grasshopper on which they feed for a period of 8–14 days, but if dislodged after as little as three days they can develop into nymphs. The larva drops to the ground and passes in succession without further feeding through a nymphochrysalis resting stage, a nymph, and an imago-chrysalis before becoming an adult. The resting stages occur in the soil. The Podapolipidae which infest *Locusta migratoria* (L) and other grasshoppers, are highly specialised, the adults being virtually sexually differentiated larvae. The mites have a life history which is complex and closely bound up with the host. An excellent account of the life of *P. diander* Volkonsky has been given by Volkonsky.²⁶⁵

Mites have also been reported as infesting Mantidae,²⁴⁰ and no doubt if sought will be found to associate with most groups of the Orthoptera. There seems to be no record of mites on British Orthoptera.

ODONATA

Surprisingly the first reference to mites on dragonflies is in an English journal,^{7,8} when McLachlan⁷ described red mites on *Sympetrum striolatum* (Charp.) and *S. meridionale* (Selys). Krendowsky²⁸² described the red mites on *Sympetrum meridionale* as the larva of *Arrhenarius papillator*, Mull. The few investigations^{263–282} made are of very high quality, mostly by Munchberg^{265–267, 269, 270, 272, 276–278} and British workers,^{273–275} Campion²⁸¹ and later Tillyard²⁸⁰ drew completely wrong conclusions concerning the associations.

The main contributions to the British Odonata-mite relationship occurs in the papers of Killington and Bathe.^{273–275} In the first paper they showed that the British species of *Leptus* which they found on eight species of British dragonflies was not continental *L. ignotus* Oudemans, but a separate species *L. killingtoni* Turk. It was thought to be mainly phoretic as, although most dragonflies were infested, there was rarely more than one mite on each dragonfly.

The second paper dealt with the mites *Arrhenurus leucharte* Piersig *A. ornatus* George and *A. neumannii* Piersig, whose life histories, as revealed by their association with dragonflies, are very similar. The authors did not note the egg stage but report from Soar and Williamson that these are found on submerged plants and stones. The newly hatched mites appear to seek mature dragonfly larvae (they are only found on last instar larvae) and hide under the wing pads. When the imago starts to emerge the mites transfer rapidly to it. Wherever they arrive on the dragonfly they make their way to the metasternum. Here they feed for up to ten days. The hosts appear to suffer no inconvenience. When fully fed the mites are lethargic and if disturbed drop off the dragonfly. The authors failed to elucidate further details of the life cycle but these have been described by Munchberg. The time cycle is approximately, parasitic larva, five to seven days, free moving stage six to seven days, nymphochrysalis four to five days, nymphal stage 35–36 days, and finally the teleiochrysalis seven to ten days; 57–65 days in all.

The third paper concerns *Limnocharis aquaticus* (L) which they conclude is a casual infestation occurring when the dragonflies touch the water.

Killington and Bathe expected to carry out further work but nothing has been published. The area in which they worked was a small one round Poole in Dorset, and no work seems to have been done elsewhere in the British Isles.

ISOPTERA

Mites have been recorded from termites and their nests in China, and Central and South America.^{283, 291} They do not seem to have been noted elsewhere even Kofoid²⁸⁶ makes no mention of Acari associations.

HEMIPTERA

Very few mites seem to have been reported from Hemiptera,²⁹²⁻³⁰² these are all fairly recent records and all bar four refer to Heteroptera. I have two records from Heteroptera but the mites have not yet been identified.

LEPIDOPTERA

Mites have been found on Lepidoptera on a number of species, but the records are single, and when we consider that probably 60–70 per cent of all entomologists, amateur and professional, study Lepidoptera, it is very surprising to find that the records are remarkably few.³⁰³⁻³³⁸ I recall that formerly in August, infestation of red mites was by no means rare on *Satyridae* and *Lycaenidae*. There are, however, not many references to the red mites; Stallwood²⁹⁰ recently mentions red mites on *Melanargia galatea* L., and Blackie³¹⁸ refers to red mites on *Eumenis semele* L. on Box Hill. The earliest reference is in *Insect Miscellanies*, p. 27, 1830, which mentions the harvest bug, probably *Leptus phalangii* F., as infesting many insects particularly *M. galatea* some so heavily that they could hardly fly. Specimens which I have had this year, have proved to carry *Leptus scheideingi* (Ouds). Both *Leptus* and *Atomus parasiticus* (Degeer) are true parasites of Lepidoptera.

Cheletomorpha lepidopterorum (Shaw) is a bright red mite sometimes common in barns and stables, which has been found on Lepidoptera but never on *Rhopalocera*.³⁰⁵ Swan's³²⁶ original specimens came from a 'phalaena' which was heavily infested under the wings. It has only rarely been recorded on Lepidoptera where, unlike other mites, it travels as an adult. The second record was by Bold³³⁶ who found it on a small common moth. Edward Newman³³⁷ referred to Bold's record in a later paper in which we found the now important words 'Nothing is more common than for insects to be infested with minute acari'. The mite has been found on a number of moths.^{305, 320, 334, 335} It is generally considered that these associations are phoretic.

Pyemates (= *Pediculoides*) *ventricosus* Newport, the hay itch mite (Fig. 11) preys on the early stages of some Lepidoptera and Coleoptera. It has many hosts.

Recently a most interesting mite infesting certain moths has been discovered by Treat³¹⁶ and named by him *Myrmonyssum phalaenodectes*. Wherever the fertile female mites arrive on the body, they go by an erratic course to the neck (Fig. 12). Here they may feed on the soft membranes in the area. The time spent on the neck depends on the mite's need to feed and readiness for egg laying. When ready the mite leaves the neck and proceeds down the centre of the body directed by the contours of the thorax and the pattern of hairs until she reaches the brush at the posterior border. This acts as the base of a triangle produced by the forewings of the moth at the centre of the transverse trough (Fig. 12). This journey from the neck to the trough takes about two minutes. There may be a long pause here until after much probing the mite decides to approach the left or right ear. Having reached the entrance to the tympanic recess, she returns to the cross road at the junction of the thorax and transverse trough seven, eight

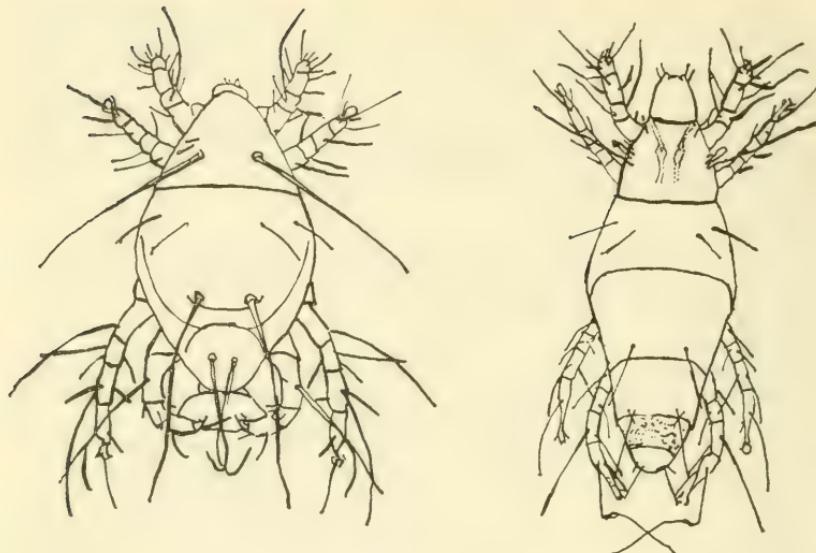


Fig. 11. The Hay Itch mite, *P. ventricosus*.

or more times at intervals of about ten minutes (obviously marking out a path) before finally entering the ear.^{310,312} Any other mites follow faithfully the path trodden by the first. Either right or left ear is attacked and the moth's reaction to sound is unimpaired. Very rarely both ears are infected, the moth is then deaf.³¹³

The eggs are laid within a few hours on the conjunctiva (Fig. 13) and when several females are ovipositing, the egg mass may fill the entire recess and overflow. As soon as eggs are laid the tympanic membrane is broken and the mites enter the tympanic sac. Eggs hatch in from 40–50 hours at a temperature of 18–25°C. The larvae emerge and burrow through the egg mass to the deeper parts of the tympanic recess and into the tympanic air sac, where they feed from the trachial membrane. Both proto and deutonymphs are found here. Males and young females with some earlier stages occupy the counter tympanic cavity. It seems that pairing takes place in this cavity. Males assume readiness for copulation on the female deutonymphs awaiting emergence of the adults. Fertile females leave a mature colony through the tympanic cavity (via the counter tympanic orifice) and take up residence near the mouth parts of the host, from where they no doubt escape to flowers, etc. During the infestation a fecal mat is formed largely shutting off the tympanic orifice. This is formed by the mites coming to defecate at the entrance to the tympanic recess. The exudate congeals on the setae forming a sticky mat.

In certain species of moth the nodular sclerite,³⁸ has modification likely to provide a protection to the tympanic membrane against invasion by mites or other parasites. Only two invasions amongst such species have been noted and these were unsuccessful.

The mite, which seems to have a world-wide distribution³¹⁵, is transferred to and from the host via flower heads at which the moths feed from time to time. What happens to it during the period when the moths are in the early stages is

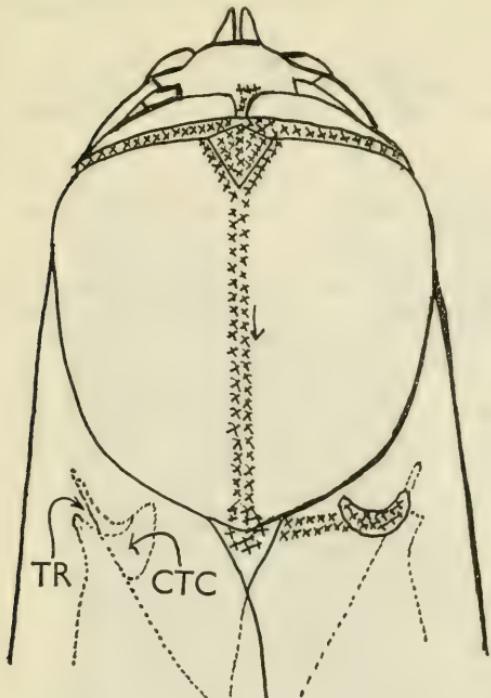


Fig. 12. Thorax of moth showing route of *M. phalaenodectes* to the ear, indicating various infestation sites. xxxx, area occupied by mites and route from neck to ear. TR = Tympanic Recess; CTC = Counter Tympanic Chamber.

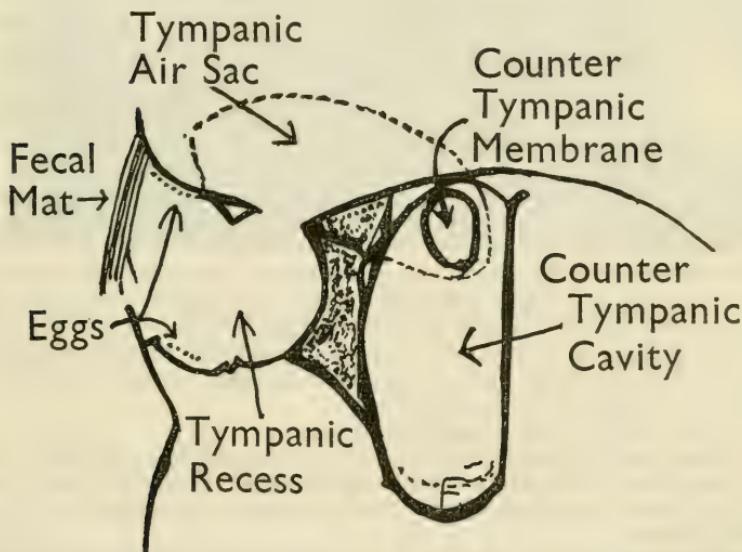


Fig. 13. Diagram of moth ear.

not known. The mites appear to have a complex social order within the tympanic regions.³¹⁶

Although the mites described on Lepidoptera are relatively few, they are probably much more common than is realised, because the hairs on the specimens hide the mites. Careful examination of collections might well increase the records.

COLEOPTERA

There have been more 'sightings' of Acari on Coleoptera than in any other order,³³⁹⁻³⁴⁹ but little investigation of the association has occurred. Some investigation has been made on infestation of *Ips* species in America.^{361, 364}

Investigations⁴²⁹ were carried out during the first world war on the mite *Acarophinax tribolii* Newstead and Duval infesting grain beetles (*Tribolium*). The female mites feed only on the adults and pupae where the cuticle is thin, and then engorge themselves on the beetle eggs, becoming so swollen as to be incapable of walking. In this species, unlike *P. ventricosus*, the whole body swells uniformly. After three days the gravid female dies and up to 14 young females emerge from the genital orifice. They are apparently mated before emerging by a single male produced. The male has only been found dead, within the body of the gravid female after the young females have departed, or close by.

Numerous species of mites have been recorded on dung beetles, Hyatt³⁷¹ has published a list of species occurring on *Geotrupes stercorarius* (L.). I myself have found several mites (Table II) not previously recorded on the dung beetles.

TABLE II
Mites associated with Dung Beetles (*Aphodius*)
New Forest near Beaulieu Road Station 25.7.70

Beetle	Mite	
<i>A. sphacelatus</i> (Panz)	<i>Macrocheles glober</i> (Müller) <i>Parasitus intermedius</i> (Berlese) <i>Saintdidieria</i> sp.A.	1 ♀ Macrochelidae 1 DN Parasitidae 1 DN Halolaelapidal
<i>A. haemorrhoidalis</i> (L.)	<i>Scuvabis inexpectatus</i> (Ouds) <i>Humerobatis rostrolamellatus</i> (Grandjean)	1 ♀ 3 DN Eviaphididae 1 adult Ceratozetidae
<i>A. fossor</i> (L.)	<i>Saintdidieria</i> sp.B <i>Scarabapis inexpectatus</i> (Ouds) <i>Rhopaloctetus lanceocrinus</i> (Ouds)	1 DN 1 DN 4 hypopi Anotidae (Lyndhurst 26.5.70)

Little is known about the life histories of any of these mites. They have no known economic or medical importance.¹³ They are supposed to feed on dung and the other commensurates of dung, and to use Coleoptera only as phoretic vehicles. However to breed them is exceedingly difficult. Perhaps normally at least one stage in the life cycle of the mite takes place, in the beetle burrows, where the beetle larvae feed on stored dung.

Mites also heavily infest *Necrophorus* species.

Cooreman and others report mites on Chrysomelidae and Carabidae, and I have found mites on *Bembidion* species and other beetles (Table III) but there are too many cases of association, some of which appear to be unique, for all to be merely phoretic.

Many deutonymphs are found as hypopi, a fasting form assumed in unfavourable conditions. In this form they ride on insects, particularly beetles, from one



Fig. 15. Hypopus attached by stem to host.



TABLE III
Mites associated with Beetles

Beetle	Mite	Data
<i>Elater balteatus</i> L.	<i>Microsejus truncicola</i> Trägärdh 1 DN Oxshott 9.5.70	
	<i>Microsejidae</i>	
<i>Silpha thoracia</i>	<i>Poccilochirus subterraneus</i> Muller 1 DN Parasitidae	Aviemore June 1970
<i>Histeridae</i>	<i>Saintdidieria</i> sp.B. 1 DN	Beaulieu Road
	<i>Scarabaspis inexpectatus</i> Ouds 1 DN Hants 25.7.70	

site to another. Figure 14 shows the two commonest forms of hypopus, the left one attached to their hosts by suckers, and the right one by means of a stalk exuded anally. Fig. 15 shows a specimen on *Aphodius sphaecelatus* Panz. This type of hypopus is found on a number of beetles. Cerambycidae can be very heavily infested with mites known only in the hypopodal stage.

The mite which I found on *Boletophagus reticulatus* L. was determined as *Schwebea boletophagi* Turk and Turk (described in 1952). Nothing is known about the life history of the mite. I believe it lives in the tunnels in fungi along with the beetle's larva and keeps down the fungal growth occurring on the frass. The hypopi can be vitalised by dropping them onto a wet glass slide. But putting them with the beetle in wet conditions does not have the same effect.

In addition to the insects already discussed mites have also been recorded from *Mantidae*,⁴⁴⁰ *Aphidae*,⁴⁴¹⁻² *Anopleura*,⁴⁴³ *Aphaniptera*,⁴⁴⁴⁻⁵ *Plecoptera*⁴⁴⁶⁻⁴⁴⁹ and *Dermaptera*.⁴⁵⁰

I hope that in this brief survey I have succeeded in convincing you that Acari-Insecta associations are, far more than phoresy, of great biological significance and worthy of serious study.

The following reference section is fairly complete as far as major contributions are concerned. Three books on mites, *An Introduction to Acarology*, *The Terres-*

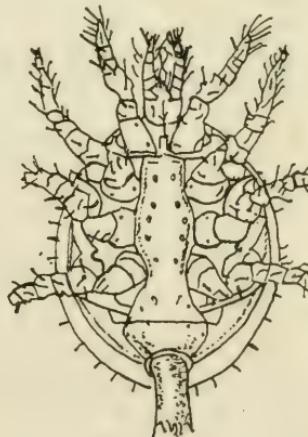
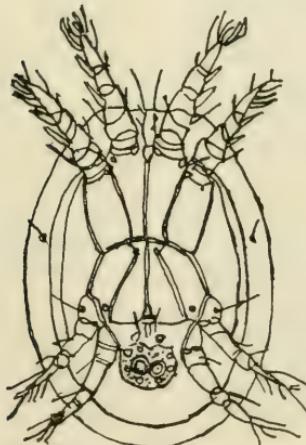


Fig. 14. Hypopi indicating method of attachment to host.

trial Acari of the British Isles, in course of publication by the British Museum (Nat. Hist.), and *The British Hydrocharina* Vol. 1-3. Ray Society, are of considerable value in the study of Acari.

Finally I must thank Mr. K. H. Hyatt of the British Museum (Nat. Hist.) for his help in identifying mites, and the trustees of the British Museum (Nat. Hist.) for permission to reproduce Figs. 1-7, 10, 11, and 14 from *The Terrestrial Acari of the British Isles* Vol. 1.

REFERENCES

1. Ford E. B., 1945, *British Butterflies*, New Naturalist 2, London.
2. Ford, E. B., 1955, *Moths*, New Naturalist 30, London
3. Imms, A. D., 1947, *Insect Natural History*, New Naturalist 8, London
4. Butler, C. G., 1954, *The World of the Bee*, New Naturalist 29, London
5. Free, J. B. and Butler, C. G., 1959, *Bumble Bees*, New Naturalist 40, London
6. Lucas, W. J., 1900, *British Dragonflies*, 74
7. McLachlan, 1864, *Ent. mon. Mag.*, 1: 100.
1876, *Ent. mon. Mag.*, 13:95; 1884 *Ent. mon. Mag.*, 20: 253.
9. Corbet, P. S., Longfield, C. & Moore N. W., 1960, *Dragonflies*, New Naturalist 41, London.
10. Longfield, C., 1937, *The Dragonflies of the British Isles*, Wayside & Woodland Series, F. W. Warne.
11. Collyer, C. H. & Hammond C. O., 1951, *Flies of the British Isles*, Wayside & Woodland Series, F. W. Warne.
12. Evans, G. O., Sheals, J. G. & Macfarlane, 1961, *The Terrestrial Acari of the British Isles Vol. 1*, British Museum Trustees.
13. Baker, E. W. & Wharton, G. W., 1952, *An Introduction to Acarology*, Macmillan, New York.
14. Evans, G. O., 1959, *Proc. S. Lond. ent. nat. Hist. Soc.*, 1958:9.
15. Soar, C. D. & Williamson W., 1925-29, *British Hydrachrina*, Vols. 1-3, Ray Society, London.

GENERAL REFERENCES

16. Faasch, H. & Schaller, F., 1966, *Zool. Anz.*, 176:176.
17. Bottger, R. & Schaller, F., 1961, *Zool. Anz.*, 167:46.
18. Crowell, R. M., 1960, *Bull. Ohio Biol. Survey*, (1), 2:1.
19. Fernando, C. H., 1959, *J. Bombay nat. Hist. Soc.*, 55:579.
20. Karrpinen, E., 1958, *Ann. Ent. Fenn.*, 24:42.
21. Schencher, R., 1957, *Akad. Verlagsges Leipzig*, 1:33.
22. Samsinak, K., 1957, *Acta Fauna Ent. Prague*, 2:109.
23. Turk, F. A., 1953, *Ann. Mag. nat. Hist.* (12), 6:1, 99.
24. Crowell, R. M., 1950, *J. Parasit.*, 36:32.
25. Anon, 1950, *Bull. Amat. Ent. Soc.*, 9:114.
26. Turk, F. A., 1948, *Proc. Zool. Soc.*, London 118:82.
27. Vukasovic, P., 1947, *Acta Med. Jugoslavia*, 1:76.
28. Turk, F. A., 1945, *Parasitology*, 36:133.
29. Sellnick, M., 1940, *Die Milbenfauna Islands Goteborgs Vetensk-Sauh Hand* 1 (6B) 1.
30. Sellnick, M., 1939, *7th Int. Congr. Ent. Berlin*, 2:1300.
31. Andre, M., 1936, *Bull. Mus. Hist. nat. Paris*, 8:240.
32. Ewing, H. E., 1932, *Proc. biol. Soc. Wash.*, 45:99.
33. Sellnick, M., 1927, *Arch. Balatonicum Tihany*, 1:173.
34. Shultz, H., 1922, *Arch. Biol. Anat. Berlin*, 11:167.
35. Berlese, A., 1918, *Redia*, 13:55.
36. Speiser, P., 1913, *Ent. Jahrb. Leipzig*, 22:154.
37. Silvestri, F., 1911, *Portica Bol. Lab. Zool.*, 5:65.
38. Speiser, P., 1909, *Danzig Ber. Bot. Zool. Ver.*, 31:23.
39. Bryant, L., 1909, *Zool. Anz. Leipzig*, 34:321.

40. Trouessant, E., 1902, *J. Roy. micro. Soc.*, 554.
 41. Oudemans, A. C., 1902, *Tidschr. Ent.*, 45:1.

HYMENOPTERA Apidae

42. Bharadwaj, R. K., 1968, *Bee World*, 49:115.
 43. Crane, E., 1968, *Bee World*, 49:113.
 44. Kitaoka, S., 1968, *Anim. Hus. Tokyo*, 22:457.
 45. Largo, F. M. & Morse, R. A., 1968, *Philipp Ent.*, 1:144.
 46. Lindquist, E. E., 1968, *Can. Ent.* 100:102.
 47. Gupta, G., 1967, *Bee World*, 48:17.
 48. Kshirsager, K. K., 1967, *Bee World*, 48:84.
 49. Pandy, R. S., 1967, *Bee World*, 48:32.
 50. Phadke, K. G., et al, 1967, *Indian J. ent.*, 28:411.
 51. Percy, A. P. & Kshirsagar, K. K., 1964, *Indian Bee J.*, 26:27.
 52. Delfinado, M. D., 1963, *S.E. Asia J. Agric.*, 2:113.
 53. Michael, A. S., 1962, *Bee World*, 43:81.
 54. Eckert, J. E., 1961, *Amer. Bee J.*, 183.
 55. Boaky, P., 1961, *Aust. Vet. J.*, 37:397.
 56. Bailey, L. P., Lee, D. D., 1959, *J. Insect Path.*, 1:15.
 57. Bailey, L., 1958, *Bee World*, 37:85.
 58. Sardar, S., 1956, *Indian J. Ent.*, 18:458.
 59. Dizar, Y. B., 1953, *Zool. Sh. Moscow*, 32:626.
 60. Gunther, C. E. M., 1951, *Proc. Linn. Soc. N.S.W.*, 76:155.
 61. Koegal, Z., 1950, *Natztier parasitologie fur Tierarzte*, Vol. 1, Herman Boden, Stuttgart.
 62. André, M., 1950, *Bull. Apiculere Fonteuvaine Le Compte*.
 63. Burnside, C. E., et al, 1949, *U.S. Dept. Agric Circular*, 392.
 64. Miles, P. S., 1948, *J. Minist. Agric. London*, 54:473.
 65. Cury, R., 1944, *Acanose das belhas Biologico S. Paulo*, 10:73.
 66. Paillet, A., 1944, *L'abeille, Anatome, Maladies-Ennemis Trevoux*.
 67. Orosi-pal Z., 1943, *Bull. Mus. Hist. nat. Paris*, 15:410.
 68. Edwards, E. E., 1942, *Bee World*, 26:10.
 69. Giavarini, I., 1941, *Arch. Zool. Torino*, 29:1.
 70. Butler, C. C., 1941, *Nature*, 148:86.
 71. Schneider, H., 1941, *Mitt Schweiz ent Ges*, 18:318.
 72. Borchert, A., 1940, *Z. ParasitKde*, 12:86.
 73. Orosi-pal, Z., 1937, *Z. ParasitKde*, 9:669.
 74. Morganthaller, D., 1937, *Schweizerischen Bienen Zeitung*, 69:3, 46.
 75. 1936, *Schweizerischen Bienen Zeitung* 4-5, 113.
 76. Orosi-pal, Z., 1936, *Berl. tier. Wschr.*, 52:521.
 77. Brugger, A., 1936, *Arch. fur Bienenkunde*, 17:113.
 78. Graverini, I., 1935, *Arti del Quarto Congresso Nazional della Sezapiot. Ital. Roma*, 1.
 79. Orosi-pal, Z., 1934, *Z. ParasitKde*, 7:233.
 80. Howarth, H. G., 1932, *J. Minis. Agric. London*, 39:833.
 81. Borchert, A., 1932, *Z. ParasitKde*, 4:331.
 82. Morison, G. D., 1932, *Bee Kingdom Leaflets*, No. 16.
 83. 1931, *Bee World*, 12:40, 70, 89.
 84. Rennie, A., 1922, *Rep. Brit. Assoc. London*, 425.
 85. Bullamore, G. W., 1922, *Parasitology*, 14:53.
 86. Harvey, E. S., 1921, *Trans. Roy. Soc. Edinburgh*, 52:765.
 87. Hirst, S., 1921, *Ann. Mag. nat. Hist. London*, (9) 7:37.
 88. Rennie, A., 1921, *Trans. Roy. Soc. Edinburgh*, 52:768.

BEES AND WASPS

89. Husband, R. W., 1968, *Pap. Mich. Acad. Sci.* 53:109.
 90. Mostafa, A. R. I., 1967, *Dist. abstr.* 28B:1977.
 91. Evans, E. O. & Till, W. M., 1966, *Bull. Brit. Mus. (nat. hist.) Zool.*, 14:107

92. Hunter, P. E., 1966, *J. Kansas ent. Soc.*, **39**:357.
93. Fain, A., 1966, *Bull. Ann. soc. ent. Belg.*, **102**:249.
94. Baker, E. W., 1962, *Proc. ent. Soc. Wash.*, **64**:1.
95. Krombein, K. V., 1962, *Proc. ent. Soc. Wash.*, **64**:11.
96. Odhiambo, T. R., 1958, *Uganda J.*, **22**:164.
97. Cooper, K. W., 1954, *Trans. Amer. ent. Soc.*, **80**:119.
98. Bohart, R. M., 1952, *Proc. ent. Soc. Wash.*, **54**:38.
99. Stammer, H. J., 1951, *Zool. Anz.*, **146**:137.
100. Green, J. & Wilkinson, W., 1951, *Ent. mon. Mag.*, **87**:143.
101. Rayment, T., 1949, *Vict. Nat. Mus. Melbourne*, **66**:118.
102. Cumber, R. A., 1949, *Proc. Roy. Soc.*, **24**:119.
103. Cooreman, J., 1948, *Bull. Mus. Hist. nat. Belg.*, **24**:1.
104. Cooreman, J. & Crèvecoeur, A., 1948, *Bull. Ann. Soc. ent. Belg.*, **84**:277.
105. Lavoipierre, M., 1946, *Nature London*, **158**:130.
106. Crèvecoeur, A., 1945, *Bull. Ann. Soc. ent. Belg.*, **81**:62.
107. Bequaert, J., 1944, *Ent. Amer. (New Series)*, **23**:255.
108. Van Eynghoven, G. L., 1943, *Ent. Ber. Gravehnage*, **11**:247, 251.
109. Turk, F. A., 1942, *Ent. mon. Mag.*, **78**:51.
110. Veuve, L., 1930, *Amer. Mus. Nov. N.Y.*, No. **432**:1; & 434.
111. Bequaert, J., 1925, *Trans. Amer. ent. Soc.*, **57**:57.
112. Roepke, W., 1920, *Tigd. Schv. ent.*, **63**:14.
113. Hull, F. E., 1917, *Vasculum*, **3**:102.
114. Oudemans, A. C., 1912, *Bull. Sci. France-Belgique Paris*, **46**:87.
115. Vitzthum, H., 1910, *Mikrocosmos Stuttgart*, **4**:37.
116. Green, E. E. & Perkins, R. C., 1904, *Spolia Zeylem*, **1**:117.
117. Green, E. E., 1903, *Ent. mon. Mag.*, **13**:232.
118. Perkins, R. C., 1901, *Ent. mon. Mag.*, **10**:37.
119. Oudemans, A. C., 1902, *Tijdschr. Ent.*, **45**:1.
120. Wasmann, E., 1899, *Dtsch. ent.*, **2**:411.

FORMICOIDEA

121. Wisniewski, R., 1966, *Pr. Kom. Nauk. roln. lesn. Poznan*, **21**:253.
122. ——————, 1965, *Pr. Kom. Nauk. roln. lesn. Poznan*, **17**:537.
123. Hunter, P. E. & Hunter, C. A., 1964, *J. Kansas ent. Soc.*, **37**:293.
124. Krantz, G. W., 1962, *J. Kansas ent. Soc.*, **35**:349.
125. Rettenmeyer, C. W., 1962, *J. Kansas ent. Soc.*, **35**:358.
126. Sellnick, M., 1962, *Acaralogia*, **4**:520.
127. Samsinak, K., 1957, *Acta Soc. ent. Bohem.*, **54**:396.
128. Vitzthum, H., 1941, *Z. ParasitKde Berlin*, **12**:307.
129. Storkan, J., 1940, *Vesk. Ceskol. Zool. Spolnec Prabe*, **8**:166.
130. Jacot, A. P., 1939, *Phillip J. Sci. Manilla*, **69**:433.
131. Balogh, J., 1938, *Folici ent. Hung.*, Budapest, **3**:106.
132. Vitzthum, H., 1935, *Zool. Anz. Leipzig*, **112**:1.
133. Donisthorpe, H. St. J., 1927, *The Guests of British Ants*, Routledge, London.
134. Menozzi, C., 1923, *Boll. Soc. ent. Ital. Genova*, **55**:72.
135. Shultz, H., 1922, *Arb. biol. anat. Berlin*, **11**:169.
136. Vitzthum, H., 1919, *Zool. Anz. Leipzig*, **50**:158.
137. Oudemans, A. C., 1916, *Ber. Ned. ent. Ver.*, **4**:266.
138. Banks, N., 1915, *Psyche Boston*, **22**:60.
139. Buxton, R. A., 1915, *Ent. Rec.*, **27**:184.
140. Szonhalth, K., 1914, *Allatl. Kozlen Budapest*, **12**:22.
141. Donisthorpe, H., St. J., 1912, *Ent. Rec.*, **24**:34.
142. Silvestri, F., 1912, *Bol. Lab. Zool. gen. Agric. R. Scuola Agric. Portici*, **6**:222.
143. Donisthorpe, H. St. J., 1911, *Ent. Rec.*, **23**:58.
144. Donisthorpe, H. St. J., 1911, *Ent. Rec.*, **23**:169.
145. Donisthorpe, H. St. J., 1911, *Ent. Rec.*, **23**:236.
146. Donisthorpe, H. St. J., 1911, *Ist Int. Congr. Ent. Brussels*, 1910, **2**:199.
147. Crawley, W. C., 1911, *Ent. Rec.*, **23**:22.

148. Silvestri, F., 1911, *Bol. Lab. Zool. gen. Agric. R. Scuola Agric. Portici*, **5**:192.
 149. Kneissl, L., 1910, *Z. Wiss. Insekten Biol. Berlin*, **6**:288.
 150. Silvestri, F., 1910, *Bol. Lab. Zool. gen. Agric. R. Scuola Agric. Portici*, **5**:55.
 151. Wheeler, W. M., 1910, *Psyche*, Boston, **17**:1.
 152. Donisthorpe, H. St. J., 1910, *Ent. Rec.*, **22**:15 & 82.
 153. Karawajew, W., 1909, *Trans. Caspian Rev. Russ. ent.*, St. Petersburg, **9**:227.
 154. Donisthorpe, H., 1909, *Ent. Rec.*, **21**:17, 287.
 155. Newell, W., 1908, *J. econ. Ent. Concord*, **1**:262.
 156. Donisthorpe, H., 1907, *Hastings Nat.*, **1**:1965.
 157. Donisthorpe, H., 1907, *Ent. Rec.*, **19**:4, 254.
 158. Kneissl, L., 1907, *Z. Wiss. Insecten Biol. Berlin*, **3**:190.
 159. Karaviev, V., 1906, *Kiev. Zap. Obse.*, **20**:200; 209.
 160. Berlese, A., 1904, *Manipulus*, **2**:299.
 161. Berlese, A., 1903, *Zool. Anz.*, **27**:12.
 162. Wasmann, E., 1903, *Zool. Anz.*, **25**:66.
 163. Leonardi, G., 1900, *Prospect. Acari of Italy*, VII, 848.
 164. Wasmann, E., 1899, *Dtsch. ent. Z.*, **41**.
 165. Hasselt, E., 1898, *Tidschi. Ent.*, **41**:66.
 166. Janet, C., 1897, *Etudes sur les formes les guêpes et les abeilles*, Vol. 13, Limoges.
 167. Janet, C., 1897, *Etudes sur les formes, les guêpes et les abeilles*, Vol 14, Limoges.
 168. Bostok, E., 1897, *Int. J. Micro.*, **6**:296.
 169. Trouessart, E., 1896, *Bull. Soc. ent. France*, No. **10**:235.
 170. Moniez, R., 1895, *Rev. biol. Nord. France*, **6**:201.
 171. Wasmann, E., 1894, *Kritisches verzeichnise der Myrmekophilen und Termitophilen Arthropoden Berlin*, F. L. Dames.
 172. Moniez, R., 1892, *Rev. Biol.*, **4**:377.
 173. Michael, A. D., 1891, *Proc. zool. Soc. Lond.*, **4**:638.
 174. Parfitt, E., 1881, *Ent. mon. Mag.*, **18**:43.

DIPTERA

175. Hill, R. S., Wilson, N., & Corbet, C. B., 1967, *J. med. Ent.*, **4**:102.
 176. Mauri, R. & Hepper, H. C., 1967, *Revta. Soc. ent. Argent.*, **29**:1966.
 177. Corbet, P. S., 1961, *Ent. Gaz.*, **12**:24.
 178. Greenberg, B., 1961, *Nature*, London, **190**:107.
 179. Southcott, R. V., 1961, *Trans. Roy. Soc. S. Aust.*, **85**:133.
 180. 1960, *Trans. Roy. Soc. S. Aust.*, **84**:163.
 181. Greenberg, B. & Carpenter, P. D., *Science*, **131**:738.
 182. Vercammen-Grandjean, P. H., 1959, *Biol. Jaab.*, **27**:98.
 183. Feider, Z., 1959, *Stud. Cercet. St. Acad. Vamine Fil. Iasi Biol. St. Agric.*, **10**:261.
 184. Davies, D. M., 1959, *Can. J. Biol.*, **37**:353.
 185. Davies, D. M., 1959, *Proc. Int. Cong. Zool.*, **15**:660.
 186. Feider, Z., 1958, *An. St. Univ. 'Alcaza' Jasl*, **4**:303.
 187. Barr, A. R., 1958, *J. Parasit.*, **44**:301.
 188. Vercammen-Grandjean, P. H., 1957, *Ann. Mag. nat. Hist. (12)*, **10**:283.
 189. Samsinak, K., 1956, *Mem. Soc. Zool. Techecosl*, **20**:353.
 190. Hiregaudau, L. S., 1956, *Indian Vet J.*, **33**:134.
 191. Feider, Z. & Sucia, I., 1956, *An. St. Univ. Al. Jasl*, **2**:163.
 192. Munchberg, P., 1956, *Z. ParasitKde.*, **17**:330.
 193. Munchberg, P., 1956, *Zool. Anz.*, **156**:314.
 194. Vercammen-Grandjean, P. H., 1955, *Rev. Zool. Bot. afr.*, **52**:252.
 195. Theodorides, J., 1955, *Vie et Milieu*, **5**:455.
 196. Womersley, H., 1954, *Stud. Inst. Med. Res. F.M.S.*, No 26, 108.
 197. Munchberg, P., 1954, *Arch. Hydrobiol.*, **49**:414.
 198. Munchberg, P., 1954, *Z. ParasitKde.*, **16**:414.
 199. Furman, D. P. & Tarshis, I. B., 1953, *J. Parasit.*, **39**:70.
 200. Bequaert, J., 1953, *Ent. Amer. Brooklyn*, **1**:33.
 201. Womersley, H., 1953, *Rec. Canterbury N.Z. Mus.*, **6**:233.
 202. Mitra, R. E. & Mitra, S. D., 1953, *Z. ParasitKde.*, **15**:429.

203. Ash, J. & Hughes, T. E., 1952, *Ann. Mag. nat. Hist.* (12), **5**:73.
 204. Smith, K. V. G., 1951, *Ent. mon. Mag.*, **87**:63.
 205. Imamura, T., 1951, *J. Fac. Sci. Hokkaido Univ. Zool.*, **10**:274.
 206. Green, J. & Wilkinson, W., 1951, *Ent. mon. Mag.*, **87**:143.
 207. Imamura, T., 1950, *Annot. Zool. Jap.*, **24**:54.
 208. Johnsen, P., 1950, *Ent. Med.*, **25**:278.
 209. Smith, K. V. G., 1950, *J. Soc. Brit. Ent.*, **3**:211.
 210. Johnsen, P., 1949, *Ent. Med. Kebenhagen*, **35**:278.
 211. Keegan, H., 1946, *Trans. Amer. Micr. Soc. Menasho*, **65**:69.
 212. Bonvier, G. P., Gashen, H., 1944, *Mitt. Schweiz. ent. ges.*, **19**:191.
 213. Grenier, P., 1943, *Bull. Soc. Path. exot. Paris*, **36**:105.
 214. Womersley, H., 1942, *Rec. S. Aust. Mus. Adelaide*, **7**:169.
 215. Pavlov, P., 1941, *Riv. Parassital Roma*, **5**:251.
 216. Vitzthum, H., 1941, *Z. ParasitKde.*, **12**:144.
 217. Vitzthum, H., 1941, *Z. ParasitKde.*, **12**:362.
 218. Mira, G., 1940, *Bull. Idrobiol. Caccici & Pescae Africa Irent. Ital.*, **1**:29.
 219. Lawrence, R. F., 1940, *J. Ent. Soc. S. Afr.*, **3**:109.
 220. Koehler, P., 1939, *Physis Beunos Aires*, **17**:473.
 221. Besseling, A. J., 1939, *Thor. ent. Ber. s'Gravenhage*, **10**:143.
 222. Barbier, N. A., 1939, *7th Int. Cong. Ent. Berlin*, **2**:1024.
 223. Leger, L. & Motas, C., 1938, *Trav. Lab. Hydrobiol. Grenoble*, **20**:25.
 224. Munchberg, P., 1937, *Microkosmos Stuttgart*, **30**:141.
 225. Munchberg, P., 1936, *Arch. Hydrobiol.*, **33**:313.
 226. Oudemans, A. C., 1935, *Ann. Parasit. Paris*, **13**:5.
 227. Collart, A., 1934, *Bull. Mus. Hist. nat. Belg.*, **10**:1.
 228. Feng, C. C., 1933, *Lingham Sci. J. Canton*, **12** Supplement No. 23.
 229. Boyd, E. M., 1922, *J. Res. Army Med. Corps. London*, **38**:450.
 230. Graham-Smith, G. S., 1916, *Parasitology*, **8**:440.
 231. Ewing, H. E., 1913, *Ent. News Philadelphia*, **24**:17.
 232. Hadwen, S. & Hewitt, G. G., 1911, *Can. Ent.*, **43**:141.
 233. Trojan, E., 1908, *Arch. Natg. Berlin*, **74**:1.
 234. Bryant, L., 1908, *Paris. C.B. Soc. Biol.*, **65**:706.
 235. Sargeant, E., 1907, *Paris. C.B. Soc. Biol.*, **62**:443.
 236. Newstead, R., Dutton, J. & Todd, J. L., 1907, *Ann. Trop. Med. Liverpool*, **1**:3.
 237. Trouessart, E. K., 1906, *Paris Bull. Soc. Zool.*, **31**:128.
 238. Dye, L., 1905, *Arch. Parasit.*, **9**:51.
 239. Laveran, A., 1904, *C.R. Soc. Biol.*, **56**:57.
 240. Gas, N. & Laveran, A., 1904, *C.R. Soc. Biol.*, **56**:56.
 241. Laveran, A., 1903, *C.R. Soc. Biol.*, **54**:233.
 242. Fenizia, C., 1903, *Boll. Nat.*, **22**:55.

ORTHOPTERA

243. Schaeffer, C. W., Peckham D. B., 1968, *Ann. ent. Soc. Am.*, **61**:1475.
 244. Naudo, M. H., 1967, *Acaralogia*, **9**:30.
 245. Womersley, H., 1961, *Trans. roy. Soc. S. Aust.*, **84**:11.
 246. Womersley, H., 1960, *Trans. roy. Soc. S. Aust.*, **83**:21.
 247. Lombardini, G., 1958, *Redia*, **43**:295.
 248. Pritchard, A. E., 1956, *Ann. Ent. Soc. Amer.*, **49**:204.
 249. Womersley, H., 1956, *Trans. Roy. Soc. S. Aust.*, **79**:104.
 250. Daniel, M. & Samsmak, K., 1955, *Zool. Zh.*, **34**:1242.
 251. Kishida, K., 1953, *Psyche*, **69**:124.
 252. Cunliffe, F., 1952, *Proc. Ent. Soc. Wash.*, **54**:153.
 253. Rochrich, R., 1951, *Ann. Epiphyt.*, **2**:479.
 254. Keegan, H. L., 1944, *J. Parasit.*, **30**:181.
 255. Volkonsky, M., 1940, *Arch. Inst. Pasteur Algerie*, **18**:321.
 256. Harris, W. V., 1940, *E. Afr. Agric. J.*, **6**:43.
 257. Lawrence, R. F., 1940, *J. Ent. Soc. S. Afr.*, **3**:173.
 258. Vitzthum, H., 1940, *Z. ParasitKde.*, **11**:457.

259. Popova, A. A., 1932, *Bull. Plant Protect. St. Leningrad Serl.*, No. 3:131.
 260. Zolotarev, E., 1930, *Bull. N. Caucasian Plant. Protect.*, St. T6-7, 239.
 261. Wehrle, L. P & Welch, P. S., 1925, *Ann. ent. Soc. Amer.*, **18**:35.
 262. Jarvis, T. D., 1906, *Can. Ent.*, **38**:349.

ODONATA

263. Mitchell, R., 1968, *Ecol.*, **49**:40.
 264. Mitchell, R., 1961, *Anim. Behav.*, **9**:220.
 265. Munchberg, P., 1960, *Arch. Hydrobiol.*, **56**:425.
 266. Munchberg, P., 1959, *Microcosmos*, **48**:361.
 267. Munchberg, P., 1958, *Z. ParasitKde.*, **18**:243.
 268. Cooreman, J., 1955, *Expl. Parc. Nat. Albert. Musce. de Witte*, No. 85, 1.
 269. Munchberg, 1955, *Microcosmos*, **44**:110.
 270. 1953, *Zool. Jb. System.*, **82**:47.
 271. Imamura, T., 1951, *J. Fac. Sci. Hokkaido Univ. Zool.*, **10**:106.
 272. Munchberg, P., 1951, *Arch. Hydrobiol.*, **45**:378.
 273. Killington, F. J., and Bathe, E. C., 1947, *Ent. mon. Mag.*, **83**:116.
 274. 1947, *ibid* **83**:145.
 275. 1946, *ibid* **82**:257.
 276. Munchberg, P., 1937, *Arch. Hydrobiol.*, **31**:209.
 277. 1936, *Arch. Naturgesch. Leipzig (NF)*, **5**:93.
 278. 1935, *Arch. Hydrobiol.*, **29**:1.
 279. Wasenberg-Lund, C., 1918, *Vidensk. Medd. Naturh. Foren. Kbh.*, **70**:1.
 280. Tillyard, R. J., 1917, *The Biology of Dragonflies*, Cambridge.
 281. Campion, F. W. & Campion, H., 1909, *Entomologist*, **42**:242.
 282. Krendowsky, M., *Trud. Obshch. Ispit. Priv. Kharkov.*, **12**:221.

ISOPTERA

283. Benoit, P. L. G., 1964, *Rev. Zool. Bot. Afr.*, **70**:174.
 284. Samsinak, K., 1964, *Entom. Abh. Mus. Tierk. Dresden*, **32**:33.
 285. 1961, *Acta Soc. Ent. Sch.*, **58**:193.
 286. Kofoid, C. A., 1934, *Termites & Termite Control*, 2nd Ed., University of California Press.
 287. Silvestri, F., 1903, *Redia*, **1**:172.
 288. 1903, *Bull. Mus. Turino*, **17**:19.
 289. Wasmann, E., 1903, *Zool. Anz.*, **25**:60.
 290. 1899, *Dtsch. ent. Z.*, **41**.
 291. 1894, *Kritisches Verzeichniss der Myrmekophilen und Termitophilen Arthropoden*, F. L. Dames, Berlin.

HEMIPTERA-HETEROPTERA

292. Newell, I. M. & Ryckman, R. E., 1966, *Hilgardia*, **37**:403.
 293. Anderson, R. C., 1968, *J. med. Ent.*, **5**:459; 473.
 294. Baker, E. W. & Johnson, D. E., 1959, *Proc. ent. Soc. Wash.*, **61**:275.
 295. Crisp, T. D., 1959, *Irish Nat. J.*, **13**:88.
 296. Feider, Z., 1957, *An. St. Univ. Al Cuza Jose N.S.* (2), **3**:219.
 297. Imamura, T., 1952, *Zool. Mag. Tokyo*, **61**:227.
 298. Cunliffe, F., 1952, *Proc. ent. Soc. Wash.*, **54**:143.
 299. Andrè, M., 1951, *Bull. Mus. Hist. Nat., Paris*, **23**:253.
 300. Andrè, M., 1941, *Rev. Franc. Ent.*, Paris, **8**:188.

HEMIPTERA-HOMOPTERA

301. Carle, P., 1967, *Revue Zool. agric. appl.*, **66**:16.

TRICHOPTERA

302. Crowell, R. M., 1967, *Can. Ent.*, **99**:730.

LEPIDOPTERA

303. Prasad, V., 1968, *Ann. ent. Soc. Am.*, **61**:611.
 304. Treat, A. E., 1967, *J. Lepidopterists Soc.*, **21**,:169.
 305. Van Eydhoven, G. L., 1964, *Beaufortia*, **11**:53.
 306. Treat, A. E., 1961, *Acaralogia*, **3**:147.
 307. Braun, R., 1960, *Kosmos Stuttgart*, **56**:219.
 308. Schroder, H., 1959, *Natur u Volk*, **89**:17.
 309. Treat, A. E., 1958, *Ecology*, **39**:629.
 310. 1958, *Nat. Hist.*, **67**:366.
 311. 1958, *Proc. 10th Int. Cong. Ent. Montreal*, **2**:475.
 312. 1957, *Trans. New York Nat. Hist. Soc.*, **65**:41.
 313. Roeder, K. D., & Treat, A. E., 1957, *J. Exp. Zool.*, **134**:127.
 314. Treat, A. E., 1955, *J. Parasit.*, **41**:555.
 315. 1955, *Lep. News*, **9**:55.
 316. 1954, *J. Parasit.*, **40**:619.
 317. Stallwood, B. R., 1952, *Entomologist*, **85**:21.
 318. Blackie, J. E. H., 1951, *Entomologist*, **84**:132.
 319. Green, J. & Wilkinson, W., 1951, *Ent. mon. Mag.*, **87**:143.
 320. Cooreman, J., 1946, *Lambillionea*, **46**:70.
 321. 1954, *ibid* **45**:10.
 322. 1945, *ibid* **45**:19.
 323. Anon, 1943, *Agric. Gaz. N.S.W.*, **54**:41.
 324. Kishida, K., 1940, *Oyo. Obuts. Zasshi*, **12**:113.
 325. Kamel, A., 1935, *6th Int. Cong. Ent. Madrid*, **2**:567.
 326. Swan, D. C., 1934, *J. Agric. S. Aust.*, **37**:1289.
 327. Kishida, K., 1929, *J. Imp. Agric. Exp. Stat. Tokyo*, **1**:96.
 328. Eggers, F., 1919, *Zool. Jahrb. Anat.*, **41**:273.
 329. O'connor, F. W., 1919, *Trans. Soc. trop. Med. London*, **13**:10.
 330. Cockle, J. W., 1914, *Can. Ent.*, **46**:332.
 331. Smith, W. W., 1902, *Trans. N.Z. Institute*, **34**:199.
 332. Thon, K., 1901, *Ann. Hoffman Wien*, **16**:31.
 333. Giard, A., 1901, *Bull. Soc. ent. France*, 205.
 334. Haller, G., 1881, *Mitt. Schweiz. ent. Ges.*, **6**:147.
 335. Berlese, A., 1881, *Att. v. Ist. Ven 13 Sci. Lett. Art. (5)*, **8**:37.
 336. Bold, J. J., 1844, *Zoologist*, **2**:68.
 337. Newman, E., 1844, *Zoologist*, **2**:681.
 338. Shaw, G. & Nodder, 1794, *Vivarium Maturae* (Naturalists Miscellany), **6**:187.

COLEOPTERA

339. Thewk, S. E. & Enns, W. R., 1968, *Acaralogia*, **10**:215.
 340. Springett, B. P., 1968, *J. Anim. Ecol.*, **37**:417.
 341. Kinn, D. N., 1968, *Acaralogia*, **10**:191.
 342. Baker, E. W., 1968, *Ann. ent. Soc. Am.*, **61**:968.
 343. Butler, L. & Hunter, P. E., 1968, *Fla. Ent.*, **51**:187.
 344. Sevastyanov, V. D., 1967, *Zool. Zh.*, **46**:351.
 345. Feider, Z., 1967, *D. Anal. Stiint. Univ. Al I Cuza (Ser. New) (Stint. nat. Biol.)* **13**:40.
 346. Thomas, T. et al, 1967, *Fla. Ent.*, **50**:268.
 347. Krantz, G. W., 1967, *Acaralogia*, **9**: Suppl. 1.
 348. Kinn, D. N., 1967, *ibid*, **9**:488.
 349. Kadzhaya, G. Sh. & Sevastyanov, V. D., 1967, *Soobsdich Akad Nank. gruz S.S.R.* **48**:195.
 350. Hurlbatt, H. W., 1967, *Acaralogia*, **9**:497.
 351. Beaver, R. A., 1967, *Entomologist*, **100**:9.
 352. Starzyk, J. R., 1967, *Przegl. Zool.*, **11**:51.
 353. Southcott, R. V., 1966, *Aust. J. Zool.*, **14**:687.
 354. Fain, A., 1966, *Bull. Ann. Soc. ent. Belg.*, **102**:249.
 355. But'er, L. & Hunter, P. E. A., 1966, *Acaralogia*, **8**:525.

356. Samsinak, K., 1966, *Zool. Anz.*, **176**:124.
 357. Ramsey, G. W., 1966, *Nature London*, **210**:845.
 358. Spies, A. & Ryke, P. A., 1965, *Mems. Inst. Invert. creut. Mocamb.*, **7A**:221.
 359. Costa, M., 1964, *Israel J. Zool.*, **13**:133.
 360. Costa, M., 1964, *J. Linn. Soc. Lond. Zool.*, **45**:25.
 361. Hunter, P. E. & Davies, R., 1963, *Proc. ent. Soc. Wash.*, **65**:287.
 362. Griffiths, D. A., 1963, *Acaralogia*, **5**:61.
 363. Ryke, P. A. J., 1961, *Acaralogia*, **3**:250.
 364. Linquist, E. E. & Bedard, W. D., 1961, *Can. Ent.*, **93**:982.
 365. Theodorides, J., 1961, *Ann. Parasit.*, **35**:488.
 366. Womersley, H., 1960, *Trans. Roy. Soc. S. Aust.*, **93**:21.
 367. Samsinak, K., 1960, *Mem. Inst. Sci. Madagascar*, **13A**:1959.
 368. 1960, *Cesk. Parasit.*, **7**:297.
 369. Rapp, A., 1959, *Zool. Jb. (Supplement)*, **86**:303.
 370. Lavoipierre, M., 1959, *Ann. Parasit.*, **33**:1958.
 371. Hyatt, K. H., 1959, *Ent. mon. Mag.*, **95**:22.
 372. Samsinak, K., 1958, *Acta Soc. ent. Cech.*, **55**:258.
 373. Hicks, E. A., 1958, *Iowa St. Coll. J. Sci.*, **33**:103.
 374. Womersley, H., 1958, *Trans. Roy. Soc. Aust.*, **81**:115.
 375. Ryke, P. A. J. & Myers, M. K. P., 1957, *Ann. Mag. nat. Hist. (12)*, **10**:593.
 376. Lombardini, G., 1957, *Redia*, **42**:283.
 377. Samsinak, K., 1957, *Acta Soc. ent. Bohem.*, **54**:180.
 378. Vercammen-Grandjean, P. H. & Audy, J. R., 1957, *Stnd. Inst. Med. Res. Kuala Lumpur*, No. 28, **24**:153.
 379. Hicks, E. A., 1957, *Proc. Iowa Acad. Sci.*, **64**:614.
 380. Borland, J. G., 1956, *J. Kansas ent. Soc.*, **29**:29.
 381. Cooreman, J., 1955, *Expl. Parc. Nat. Albert Musse de Witte*, No. 85, 1.
 382. Womersley, H., 1956, *Trans. Roy. Soc. S. Aust.*, **79**:104.
 383. Theodorides, J., 1955, *Vie et Milieu*, Suppl. 4, **1**:310.
 384. Hirschmann, W. & Ruhm, W., 1954, *Nach. Naturw. Mus. Asch. Affent.* No. 43, 41.
 385. Womersley, H., 1954, *Stud. Inst. Med. Res. F.M.S.*, No. 26, 108.
 386. Cooreman, J., 1953, *Bull. Mus. Hist. nat. Belg.*, **29**:31.
 387. 1952, *Bull. Inst. Sci. nat. Belg.*, **28**:1.
 388. 1952, *Bull. Ann. Soc. Ent. Belg.*, **88**:234.
 389. Shaw, S., 1952, *Naturalist*, No. 843, 170.
 390. Tragardh, I., 1951, *Ark. Zool.*, N.S., **1**:361.
 391. Cooreman, J., 1951, *Bull. Mus. Hist. nat. Belg.*, **27**:1.
 392. Green, J. & Wilkinson, W., 1951, *Ent. mon. Mag.*, **87**:143.
 393. Goux, L., 1950, *Bull. Soc. zool. France*, **75**:218.
 394. Judd, W. W., 1950, *Ann. ent. Soc. Amer.*, **43**:608.
 395. Cooreman, J., 1950, *Bull. Mus. Hist. nat. Belg.*, **26**:35.
 396. Keegan, H., 1950, *J. Parasit.*, **36** Sect. 1,511.
 397. Cooreman, J., 1950, *Inst. Roy. Sci. nat. Belg.*, **26**:1.
 398. Lombardini, G., 1949, *Redia*, **34**:67.
 399. Devantoy, J., 1948, *Feuille Nat. Paris*, N.S. **3**:85.
 400. Tragardh, D. I., 1948, *Ent. Tidskhr.*, **69**:123.
 401. Redikortev, V. V., 1947, *Ent. Obozr.*, **29**:247.
 402. Doetschmann, W. H., 1947, *J. Mammal Baltimore*, **28**:299.
 403. Graber, H., 1947, *Zool. Nachr. Half. Deuts. Pfauzeuschutzdieust.*, **1**:7.
 404. Johret, P., 1946, *Entomologiste (Paris)*, **2**:35.
 405. Tragardh, I., 1946, *Ent. Medd. Kjobinh.*, **24**:369.
 406. Jolivet, P., 1945, *Entomologiste (Paris)*, **1**:141.
 407. Bonvier, G. & Gaschen, H., 1944, *Mitt. Schweiz Ent. Ges.*, **19**:191.
 408. Krishna-Agyar D. N. & Margabando, V., 1944, *J. Bombay Nat. Hist. Soc.*, **44**:461
 409. Lombardini, G., 1944, *Redia*, **30**:1.
 410. 1943, *Agric. Colon. Firenze*, **37**:67.
 411. 1942, *Agric. Colon. Firenze*, **36**:46.

412. Van Eyndhoven, G. L., 1942, *Vers. Wetensch. Med.*, **78** *Winterberg Med. Ent. Wer.*, 36.
413. Womersley, H., 1942, *Trans. Roy. Soc. S. Aust.*, **66**:85.
414. Lombardini, G., *Missioni Biol. Seignon-Orio Arts R. Acad. Ital.*, **12** Zool. 6.
415. 1941, *Agric. Colon. Firenze*, **35**:146.
416. Womersley, 1941, *Rec. Aust. Mus. Adelaide*, **7**:51.
417. Lombardini, G., 1940, *Boll. Soc. ent. Ital.*, **72**:10.
418. Lawrence, R. F., 1940, *J. ent. Soc. Afr.*, **3**:109.
419. Lombardini, G., 1940, *Boll. Soc. ent. Ital.*, **72**:102.
420. Floch, H. & Abonnenc, E., 1940, *Pub. Inst. Pasteur, Guigare*, No. 20, 1.
421. Eckstein, K., 1939, *Forst. Archiv.*, **15**:268.
422. Lombardini, G., 1938, *Mem. Soc. ent. Ital.*, **17**:44; 118.
423. Pearce, E. J., 1936, *Ecol. Monog. Durham N.C.*, **6**:455.
424. Leech, J. G., Orr, L. W. & Christensen, C., 1934, *J. agric. Res.*, **49**:315.
425. Campos, F., 1930, *Rev. Col. Rocafuerte Guaycquil*, **12**:7.
426. Vitzthum, H., 1926, *Treubia Batavia*, **8**:1.
427. Pearce, E. J., 1922, *Ent. mon. Mag.*, **58**:37.
428. Koenike, F., 1918, *Arch Hydrobiol.*, **12**:373.
429. Newstead, R. & Duvall, H. M., 1918, *Roy. Soc. Pests (War) Committee*, No. 2.
430. Nordenskiöld, E., 1915, *Helsingfors Medd. Soc. Fauna & Flora Form*, **41**:95.
431. Piatakov, M., 1915, *Rev. Russ. ent. Petrograd*, **15**:125.
432. Tullgren, A., 1912, *Leiden Wates Mus. Jentiusk*, **34**:259.
433. Distant, W. L., 1908, *Zoologist* (4), **12**:77.
434. Green, E. E., 1908, *ibid.*, 159.
435. Smith, W. W., 1902, *Trans. N.Z. Inst.*, **34**:199.
436. Tragardh I., 1902, *Zool. Anz.*, **25**:617.
437. Maskell, W. M., 1893, *Trans. N.Z. Inst.*, **25**:199.
438. Canestrina, G., 1885, *Atti. Inst. venet.*, **2**:719.
439. 1884, *Bull. Soc. Zool.*, 107.

MANTIDAE

440. Vitzthum, H., 1940, *Z. ParasitKde.*, **11**:457.

APHIDAE

441. Feider, Z. & Agekian, H., 1967, *Trav. Mus. hist. nat. Gr. Antipa*, **7**:71.
442. Vitzthum, H., 1912, *Z. Wiss. Insecten Biol. Berlin*, **8**:61; 94; 129; 179; 231; 289.

ANOPLEURA (Mallophaga)

443. Radford, C. D., 1949, *Proc. Zool. Soc. Lond.*, **118**:933.

APHANIPTERA (Fleas)

444. Fain, A., 1966, *Rev. Zool. Bot. Afr.*, **73**:159.
445. Fox, C., 1909, *Ent. News*, **20**:216.

PLECOPTERA

446. Vitzthum, H., 1941, *Z. ParasitKde.*, **12**:144.
447. Imamura, T., 1950, *Annot. Zool. Japan*, **24**:54.
448. Womersley, H., 1953, *Rec. Canterbury N.Z. Mus.*, **6**:233.
449. Munchberg, P., 1954, *Arch. Hydrobiol.*, **49**:414.

DERMAPTERA

450. Radford, C. D., 1953, *Parasitology*, **42**:239.

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(Proceedings and Transactions 1963, Part 2)

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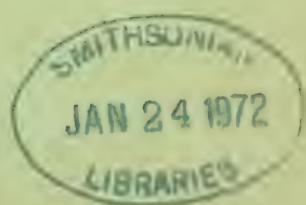
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'PIERIS NAPI' IN AMERICA: RECONNAISSANCE

(Lep., Pieridae)

S. R. BOWDEN

A European lepidopterist interested in the *Pieris napi* L. group of butterflies obtains only a very inadequate idea of its possible evolution if he neglects its representatives in North America. He may, too, tend to regard *P. napi napi* as typical in more than the taxonomic sense—an impression which is a fortuitous consequence of Linnaeus's residence in the territory of this particular subspecies. Perhaps he should, instead, try regarding ssp. *napi* as another of the marginal forms existing today.

Until recently the Nearctic subspecies, including even *Pieris virginensis* Edwards, were all referred to *P. napi*, or in certain cases to *P. bryoniae* Ochsenheimer. Müller and Kautz (1939), indeed, possibly following a misguided contention of Edwards (1881), attributed them all to *bryoniae*. It was not until 1960 that Maeki and Remington found that *virginensis* had one more pair of chromosomes ($n=26$) than *napi* ($n=25$), and so removed doubts about its specific distinctness, which should already have been obvious enough. More hazardously, Warren (1963) distinguished no less than six species in the Nearctic region: *bryoniae*, *napi*, *oleracea* Harris, *mogollon* Burdick, *venosa* Scudder and *virginensis*. In a later (1968) rearrangement he made the number nine. Since he separated these specifically, on the sole evidence of their androconial scales, it is clearly desirable to determine what other characters can be adduced to confirm or perhaps modify his conclusions. Whether the many subspecies, finally assembled in suitable order, are brought under one, two, six or more species is likely to be a matter of personal choice; in this group, though relationships can be imputed, specific status is ultimately almost indefinable.

In trying to reach tentative conclusions on subspecific and specific affinities we can take account of many criteria, though how these should be weighted is not self-evident. The adult can be examined for characteristic melanistic markings above and below. The pterin pigments present can be identified and in reasonably fresh specimens estimated physicochemically. Androconial scale shapes (with their normal range of variation) and certain elements of wing-shape, etc., can be compared. All these data can be obtained from dried material, as can the distribution of natural hybrids, if sufficiently wide collections are available.

The application of other criteria, of equal or greater import, demands the use of living stocks: larval and pupal characters, food-plant preferences, chromosome-number and other karyological data, and particularly the consequences of hybridisation. These consequences may include irregular mitosis or meiosis, inviability or infertility of F_2 or F_3 hybrids, protogyny or excessive protandry, disturbed sex-ratio or even complete failure of one hybrid sex to mature. Refusal of butterflies of different *napi-bryoniae* subspecies to pair naturally in captivity would strongly indicate wide separation, but in our experience some pairings always take place. No single criterion is acceptable in isolation until it has been found to be a regular contributor to consensus.

Thus an adequate study of European and American *napi* butterflies and their interrelationships would take many years to complete, even without necessary experiment on the intervening Asiatic insects. The present account relates only to the initial stages of a continuing reconnaissance: the breeding in England of three Nearctic subspecies—*Pieris virginensis*, *P. napi oleracea* and *P. napi marginalis* Scudder. The availability of these I owe to the persistence and patience

of Mr. S. A. Hessel of Washington, Conn., and Mr. C. W. Nelson of Portland, Oregon.

BREEDING OF *P. VIRGINIENSIS*

A female *virginiensis* was taken on 12.v.62 by Mr. Hessel at Washington, Conn. A week later I received by air the dead female and part of the eggs that she had laid. These were hatching on arrival, and at first the larvae fed on the *Dentaria diphylla* Michx. leaves sent with them. They would only nibble at *Alliaria petiolata* Bieb. and *Hesperis matronalis* L. I also tried (but did not persist with) *Cardamine pratensis* L. I took the larvae with me to France and some days later found *Dentaria bulbifera* L. growing, but by this time the last of the larvae had died.

Mr. Hessel had retained some eggs and reared the larvae. The resulting 17 pupae he sent over to England in September, together with rhizomes of *Dentaria diphylla*. The plants appeared above ground in my Hertfordshire garden in March 1963, soon after the melting of the snow in that year. It was clear that they would feed on only a small number of larvae to maturity, nor have I been able since to induce the plants to spread. Substitute food-plants had to be located and confirmed as suitable.

From the beginning of June 1963 I was able to obtain *Dentaria bulbifera*, by courtesy of the Hertfordshire naturalist, Mr. R. F. Turney, who showed me a woodland locality about ten miles away in the Chess valley where this little-known species grows wild. Both species of *Dentaria* are plants of the early spring, and die down inconveniently early. Later that month I had to take larvae to Angus, and some still remained when the *Dentaria* which I carried in tins deteriorated; but here I found that *Cardamine pratensis* could be used. In 1964 *Cardamine* also failed me, when the Redbourn meadow where it grew was sprayed with weed-killer. In these early years I depended almost entirely on *Dentaria bulbifera*, and breeding was confined to its season, but in 1965 I tried watercress (*Nasturtium*) and this proved satisfactory, though larvae would not eat it while there was even the most miserable *Dentaria* as an alternative.

I have described elsewhere (1971) the ruthless experiments that I made with these and other food-plants. Although the *virginiensis* females actually laid preferentially on *Alliaria*, the larvae would never continue to eat it.

In April 1963 I took six pupae out of cold storage. Pupae of *virginiensis* are distinguished from those of *P. napi napi* by marked differences of proportion: in particular the alar projections are much more prominent in relation to the noticeably more slender body, the frontal tubercle is more elongated and the slender thoracic keel has a bulbous profile. This pupal disparity alone is almost convincing evidence of specific separation from *napi*—but probably in the past *virginiensis* pupae have been compared with *oleracea* rather than with European *napi*.

When the butterflies emerged in mid-May their almost complete lack of upper-side marking made it difficult to determine their sex while they were under only partial restraint. Females have more rounded wings, with sometimes traces of the marking normal in *P. napi napi*, and are generally more ochreous, at least below. Subsequent examination of external genitalia showed that in fact no mistakes were made.

Two females and two males caged together produced about 200 eggs on *Dentaria diphylla* and *Alliaria*: successful rearing was mainly on *Dentaria bulbifera*.

The larvae of *P. virginiensis* are distinguished from those of *P. napi napi* most

conspicuously by the absence of the bright yellow encircling the spiracles. These yellow rings are absent also in ssp. *oleracea* and *marginalis*, though even *P. rapae* carries yellow adjacent to the spiracles.

In all, 25 sound pupae were obtained, of which only five were of the green form. All lay over the winter and butterflies emerged well in May and June 1964, eight or nine days after removal from cold storage.

A further generation was then bred from a pair of June butterflies. The female laid about 60 eggs in less than a week and disappeared. The larvae hatched well, but food supplies were inadequate and rearing losses were therefore high. After two males and one female had emerged without diapause (17.vii to 2.viii.64) and one green pupa had blacked off, only four pupae remained for storage over the winter.

Meanwhile Mr. Hessel had obtained eggs from four or five females in Connecticut and sent over 21 pupae in early June 1964: these were all in diapause. In 1965 further broods were raised from a pair of these and by caging two males with three females from the four pupae mentioned above.

Six more broods were reared in 1966–67, largely on watercress. One 1966 brood produced a few 'summer' specimens.

The *virginiensis* phenotype

P. virginiensis has an extremely fragile appearance; in size it seems very variable—often much smaller than the 49 mm which it attains on occasion. Coloration and marking are as described by Hovanitz (1963).

The upperside is milk-white in both sexes, a colour appreciably less pure than that usual in ssp. *oleracea* and ssp. *napi*. The hindwing underside is slightly ochreous, especially in the female, but completely lacks the light lemon-yellow pigmentation found in European wild-type *napi* and in *oleracea*; in this respect it resembles the morph *subtalba* Schima found in some *bryoniae* populations (Bowden 1966).

Both sexes usually carry dark scales at the forewing apex; these lie along the vein-ends and do not unite into a continuous patch. There is also dusky scaling at the base of the wings, along part of the costa and of the main veins. In addition, some females show rather faintly the forewing pattern characteristic of European *napi* females—two dark spots on the outer part of the discal area and a streak along the hind margin (Hovanitz 1963 calls this the 'rapae-type' pattern).

The hindwing-underside vein-marking is an important character in *P. virginiensis*. This marking, almost distinctive of the *P. napi* group of butterflies, takes different forms in the various species and subspecies. Basically, it comprises a border of dark scales on each side of the hindwing veins. In most European subspecies, black and yellow scales are mingled, and the proportion of black diminishes away from the vein; there is usually a sprinkling of black over the vein itself. The distinctive sharp *oleracea* marking will be described below. Not only does the breadth of the marking vary in different subspecies; it may (in some) taper towards the outer margin. In both respects there is also individual variation within the subspecies.

In *virginiensis* the vein-marking is rather broad, with indefinite edges, and continues more lightly over the lines of the veins themselves. The marking usually, but not always, tapers towards the margin as in European *napi*; sometimes indeed it becomes broader towards the margin and leaves only thin streaks of background colour between the veins. Though the dark scales vary in colour very few (even on the upperside) are black—rather, a pale brownish grey.

In the occasional summer emergence the male may show a definite discal

spot, and both sexes lose almost completely their underside vein-marking. Both these modifications are in line with those found in non-diapause *napi* elsewhere. Hovanitz (1963) says that the appearance of *virginiensis* does not change during the seasons, but this is not strictly correct, even as a statement of univoltinism. Nevertheless, 'weather conditions' as such are not mainly responsible, either in *virginiensis* or in *oleracea*.

BREEDING OF *P. NAPI OLERACEA*

In 1963 Mr. Hessel bred large numbers of this species from New Hampshire females. Most of the butterflies emerged at the end of June, but in early September he kindly sent 13 pupae expected to over-winter. Four died before cold storage in December.

The remainder were brought out in early May 1964 and produced four males plus three females, which were all used for breeding. The butterflies were not too easy to sex; however, all the determinations were in fact confirmed after death.

One pair was caged for pure *oleracea*. The male died after three days, and the female laid only 25 eggs. *Alliaria* was supplied as food. Several larvae died or failed to grow, and alternative plants were tried: *Sinapis arvensis* L. (Charlock), *Sisymbrium officinale* L. (Hedge Mustard) and *Dentaria*. The nine butterflies obtained after diapause were all small except one male. Apart from one female, all were used in unsuccessful attempts to breed further and to hybridise with *virginiensis* and with European *bryoniae*.

The larvae of *oleracea* lack the bright yellow circumspiracular rings of *napi* and the pupae depart from the *virginiensis* shape (in the direction of ssp. *napi*) to a surprisingly small extent. Scudder (1889) compared the early stages of *oleracea* and European *napi*, but for Scudder *oleracea* included *virginiensis*, so his comparison is to that extent uncertain. However, he made a good case for specific separation of his '*oleracea*' from *napi* on morphological grounds.

Early in July 1965 a further 34 pupae were received from Mr. Hessel. Nearly all were of the green form; the single buff pupa was the only one that proved to be in diapause. Pairings were made to obtain three large broods, as well as hybrids with *virginiensis* to be described in a separate paper.

In 1966 two more broods of *oleracea* were obtained, but these were affected by a refrigeration failure in 1967 and subsequent pairings produced no fertile eggs.

Ssp. *oleracea* is less selective in its food requirements than *virginiensis*: it can be reared conveniently on *Hesperis*, *Sisymbrium* and *Nasturtium* are also suitable, but *Alliaria* is not, though at least some of the larvae eat a little more of it than *virginiensis* will.

The *oleracea* phenotype

This subspecies is usually appreciably larger than *virginiensis*, frequently attaining a spread of about 53 mm.

The ground-colour of the upperside is a rather pure white in both sexes; the underside of the hindwings and of the forewing-tips has a light, rather greenish, yellow ground. Whether the *subtalba* morph occurs anywhere in the range of *oleracea* I do not know.

The usual spot-markings of European *napi* are almost absent in *oleracea*, though in an occasional female there is a ghost of the European pattern. Both sexes normally have dark scales lying along the vein-ends of the forewing apex, and some dark marking of the main forewing veins occurs particularly in the over-wintering brood.

On the underside of the hindwing, in this same brood, the dark veining is

narrower, denser and has a more definite edge than in *P. napi napi*; typically the vein itself is left nearly clean, though in the more heavily marked specimens it may be submerged in brownish black. Tapering of the markings towards the margin is less than in ssp. *napi*. In its narrowness the marking is reminiscent of several related pierids of eastern Asia, but its characteristic division by the pale line of the vein (in the spring emergence) reappears fully only in South American *Tatochila* species, as far as I am aware; although *Tatochila* is close to *Pieris*, the androconia show them to belong to distinct groups.

In the non-diapause generations the vein-marking diminishes and at the same time is reduced to a single strip which may not be much wider than the vein; indeed in typical summer specimens this marking disappears completely or almost completely.

The underside of the forewing does not carry the one or two black spots usual in *napi*. Over-wintered individuals have the forewing underside veins lined with black; when this forewing marking is very heavy it begins to take on the special character of the hindwing pattern: that is, the almost unmarked vein has a dark line on each side of it.

BREEDING OF *P. NAPI MARGINALIS*

The stock, derived from eight wild females, was provided in July 1966 by Mr. C. W. Nelson of Portland, Oregon (see also Bowden 1970a: the course of the subsequent breeding is set out in that paper). There was no difficulty in maintaining *marginalis* in England. Watercress was used as food from the beginning. Though unable to live long on *Alliaria*, the larvae can be reared easily on *Hesperis* as well as on *Cardamine* and *Sisymbrium*. Its requirements seem therefore to be similar to those of ssp. *oleracea*.

The *marginalis* phenotype

The adult *marginalis* shows marked differences from *oleracea*. Both sexes are more or less tinged, even on the upperside, with lemon yellow, and this extends to the disc of the forewing underside; the underside of the hindwings and of the forewing-tips is brighter yellow than in *oleracea*. Especially perhaps, in non-diapause broods, the upperside of the forewing-tips is frequently bordered with lemon, and this may in females extend to the whole outer margin. While some males, even when fresh, are nearly white above, at the other extreme females are occasionally sulphur-yellow.

The underside vein-markings in the 'summer' broods are reduced or absent, as in *oleracea*; in the spring emergence it can be seen that the veining is of the *oleracea* pattern but much less intense—the black scales are sparser.

The forewing-tip rarely has a rather weak black patch on the upperside. A very few 'summer' males develop a black discal spot. Female markings are basically similar to those of European *napi*, but the radial marginal streaks characteristic of ssp. *napi* are absent, and the upper discal spot is usually weaker than the lower. There may be no upper spot, or even no spots at all, but there is, even then, some development of a diffused black streak along the forewing hind margin.

The pupa of *marginalis* resembles that of European *napi* or *bryoniae* rather closely.

DISCUSSION

A previous paper (1970b) has discussed in general terms some aspects of the Holarctic speciation of the *Pieris napi* group. On the principle that, when doubt remains, a subspecies is to be retained in *napi* rather than split off as a separate

species, all the Nearctic taxa can be referred provisionally to *napi*, with the exception of *P. virginianensis*. A reassessment should be made after a more comprehensive study, whose conclusions can be expected to stand. Nevertheless, if I had encountered *oleracea* or *marginalis* without previous knowledge, it might never have occurred to me that they could be conspecific with *napi*.

At least three more American subspecies need investigation before American '*napi*' can be dealt with as a whole. These are *venosa* Scudder of California, *hulda* Edwards of Alaska and a south-western population (preferably the high-altitude *macdunnoughii* Remington of Colorado).

Meanwhile it can be proposed that the following macroscopic adult characters be used in the recognition of the various taxa:

Underside veining (1) diffuse and broad,

(2) narrow and sharply defined.

Hindwing underside ground-colour (1) bright yellow,

(2) pale greenish yellow,

(3) white or ochreous white ('*subalba*').

Upperside ground-colour in female (1) white,

(2) light citron-yellow,

(3) ochreous yellow.

Upperside marking (1) evanescent,

(2) resembling that of *napi napi*

(a) napi-streak absent in female,

(b) napi-streak present in female,

(3) resembling that of *napi adalwinda*, with bryo-streak present in female,

(4) other.

Summer emergence (1) normally none,

(2) with much reduced marking above and below,

(3) with strong marking above.

(The napi-streak, absent in *P. rapae*, is that on vein Cu_{1b}, joining the anterior edge of the second discal spot to the margin. The bryo-streak, characteristic of *P. bryoniae*, joins the centre of the same spot to the margin.)

None of these visible characters seems to be primarily adaptive, though they may be genetically linked with adaptations (even the supposed adaptation of female *bryoniae* and *adalwinda* to absorb radiation is questionable). Nor are they in any sense a direct consequence of local environments.

In addition it will be shown later that two quantitative characters can be applied: relative antenna-length and a group of parameters derived from measurements of the pupa. These again are (within limits) selectively rather neutral characters, and should serve to suggest past relationships. We have at the moment insufficient data for their statistical treatment and profitable discussion, but they seem to bring closer certain geographically adjacent subspecies which one would otherwise separate specifically: European *napi* and *bryoniae*; American *virginianensis* and *oleracea*. On the other hand they distinguish *oleracea*, *marginalis* and *napi*.

Some experiments involving hybridisation of *P. virginianensis* and *P. napi marginalis* with European *napi* have been reported (1966, 1970a). These, with others yet to be published, enable the dominance-relationships of the distinctive adult characters to be established. They also provide evidence of varying degrees of genetic imbalance in hybrids, which may be critically important in deciding where lines should be drawn between species and subspecies.

SUMMARY

Study of the relationships of Nearctic *Pieris* must be based on a large number of characters, many of which are not available unless the various subspecies are bred in captivity. *Pieris virginiensis*, *P. napi oleracea* and *P. napi marginalis* have been bred in England and their distinctive characters noted. All could be raised on *Nasturtium officinale* but none on *Alliaria petiolata*.

REFERENCES

- Bowden, S. R., 1966. Polymorphism in *Pieris*: 'subtalba' in *P. virginiensis*. *Entomologist* **99**:174-182.
- , 1970a. Polymorphism in *Pieris*: f. *sulphurea* in *P. napi marginalis*. *Entomologist* **103**:241-249.
- , 1970b. *Pieris napi* L.: speciation and subspeciation. *Proc. Brit. ent. nat. Hist. Soc.* **3**:63-70.
- , 1971. American white butterflies and English food-plants. *J. Lepid. Soc.* **25**:6-12.
- Edwards, W. H., 1881. On *Pieris bryoniae* Ochs. and its derivative forms in Europe and America. *Papilio* **1**:84-89.
- Hovanitz, W., 1963. The relation of *Pieris virginiensis* to *P. napi*: species-formation in *Pieris*? *J. Res. Lepid.* **1**:124-134.
- Maeki, K. and C. L. Remington, 1960. Studies of the chromosomes of North American Rhopalocera 2. *J. Lepid. Soc.* **14**:37-57.
- Müller, L. and H. Kautz, 1939. *Pieris bryoniae* O. und *Pieris napi* L. Vienna.
- Scudder, S. H., 1889. *Butterflies of the Eastern United States and Canada*. Cambridge, Mass.
- Warren, B. C. S., 1963. The androconial scales of the genus *Pieris* 2: the Nearctic species of the *napi*-group. *Ent. Tidskr.* **84**:1-4.
- , 1968. On the Nearctic species of the *bryoniae*- and *oleracea*-groups of the genus *Pieris*. *Ent. Rec.* **80**:61-66.

53, Crouch Hall Lane,
Redbourn, Herts.
9th September 1971

Lepidoptera in Spain. The months of January and February 1971 were spent near Almeria on the south coast of Spain and it was noticeable that the date of flight sometimes varied considerably from that published by Higgins & Riley (1970, *A Field Guide to the Butterflies of Britain and Europe*), as the following data show. The Higgins and Riley flight periods are shown in parentheses.

Papilio machaon L., first seen 24th February when one was taken, after this three or four were noted every day up to the 1st March. All were on cultivated land, mostly tomatoes and potatoes, near the sea. (April/May-July/August.)

Iphiclides podalirius L., three seen on coast road on rocky hillside on 16th February, three more were seen and one taken on 17th February. (Mar/September.)

Zerynthia rumina L., common on rocky hillside and along ravine coming down to the beach, on 25th February. No females seen. (February/May.)

Pieris brassicae L., two examples seen on 14th February, thereafter common. (April/May.)

Pieris rapae L., first seen on 17th January and then one or two daily up to 5th February and thereafter common. (March or later.)

Pontia daplidice L., a few from 26th February onwards. (February/March.)

Euchloe belemia Esp., fairly common from 17th February onwards. (February/March.)

Colias crocea Geoff., first seen on 16th January, then one or two daily up to 31st January. Three female form *helice* Hübn. seen ovipositing on 6th February. From then on several males every day. (April/May.)

Gonepteryx cleopatra L., one on 17th January, two on 8th January, one on 25th January, two on 2nd February; after 25th February fairly common. No females seen. (May/June.)

Nymphalis polychloros L., one at 1,000 ft in an olive grove in good condition on 23rd February. (June/July.)

Vanessa atalanta L., one on 22nd January, one on 31st January, one on 2nd February and one on 26th February; all seemed in fine condition. (May/October.)

Aglais urticae L., one on 22nd January, two on 5th February, one on 6th February, two on 9th February, one on 22nd February, two on 25th February and one on 1st March. These looked like newly hatched specimens. (May or later . . . hibernated specimens March/April.)

Vanessa cardui L., two on 14th January, two on 15th January, one on 16th January, one on 26th January, one on 2nd February and one on 7th February. All were worn and faded. (April onwards.)

Pararge aegeria L., first seen on 21st February, thereafter common. (March or later.)

Callophrys rubi L., two on 23rd February at 1,000 ft on damp earth. (March or later.)

Lycaena phlaeas L., one on 21st February, one on 25th February and two on 26th February. (February/March.)

Lampides boeticus L., two on 18th January, one on 23rd January, three on 26th February and three on 27th February. All worn and faded. (Throughout summer.)

Glaucoopsyche melanops Boisd., on 23rd and 25th February, fairly common thereafter. (April/May.)

Cyaniris semiargus Rott., one female on 25th February and one female on 27th February. (End June/July/August.)

Polyommatus icarus Rott., two males on 24th February and one male on 27th February. (April or later.)

Carcharodus alceae Esp., several on 26th February, thereafter fairly common. (April/May.)

A. E. G. BEST, Hillside, Westfield, Hastings, Sussex,
3rd April 1971.

SPHINGIDAE (LEP.)—EAST VERSUS WEST AFRICA

By D. G. SEVASTOPULO, F.R.E.S.

MacNulty's comprehensive paper on 'Outline Life Histories of West African Sphingidae' (1970, *Proc. Brit. ent. nat. Hist. Soc.*, 3:95–122) reveals some interesting differences between the two sides of the Continent. I would, however, ask him to include the family name of the various food-plants recorded in future papers; I can find no reference in any of my botanical literature to the names *Newboldia* and *Anchomenes* for example, and so am at a loss to know how these plants fit into the general pattern.

Shape of the head and horn in any particular instar seem to be the only invariables in variable larvae, and even the horn shape can be altered by an accident in an earlier instar. I once thought that the colour of the spiracle was a constant, Bell & Scott (*Fauna of British India, Moths*, 5) use it to distinguish the very similar larvae of *Cephonodes hylas* L. and *C. picus* Cr.; but the larva of *Herse convolvuli* L. can have the spiracle black or red, and West African *Andriasa contraria* Walker have them yellow, whilst East have them bright green or blue.

Hereunder my notes on some of the species included in Dr. MacNulty's paper.

Herse convolvuli L. I agree that this is an extremely variable larva, particularly in the dark form. In East Africa the green form is reasonably constant, although I had one which lacked any black on the head, the black spots in which the spiracles are set, the black legs and the black tip to the horn. The normal green form has the head green marked with black and the horn orange-yellow with a black tip. Bell & Scott, *Fauna of British India, Moths*, 5, give a very complete description and some good figures of the various larval forms. It is also recorded as feeding on *Dolichos*, *Phaseolus*, *Arachis* (Papilionaceae), *Helianthus* (Compositae) and *Bambusa* (Gramineae), but I am very doubtful of the correctness of the last. The egg is extremely small compared to the size of the moth and is a much bluer green than most sphingid eggs.

Acherontia atropos L. We have three larval forms in East Africa; green with bluish markings, yellow with lavender, and a brown form. The green and yellow forms seem to be separated by an unstable blue pigment, blown green larvae are almost indistinguishable from yellow, and when a number of larvae are reared together they are yellow in the last instar, whilst larvae reared singly and wild larvae are usually green. The brown form seems to be genetic in origin, but I have never reared it *ab ovo*. Its habits are completely different from the green and yellow forms, feeding at night and hiding beneath clods of earth by day, it can often be found climbing the trunks of the food-trees in the early evening and descending shortly before dawn. Contrary to what Dr. MacNulty writes, I have found the brown form very constant in East Africa. I have published a list of the food-plants in 1970 (*Ent. Rec.*, 82:272). I have had one case of spiral segmentation (1966, *Entomologist*, 99:185) which resulted in a double horn. Contrary to what has sometimes been recorded, the female does not require to fly long distances between the laying of each egg; I have had captured females laying 50 or 60 eggs in one night when confined in quite a small receptacle. The imago does come to mercury vapour light in East Africa.

Coelonia mauritii Butler. Here again I have found the two East African forms, green and brown, very constant. I have not found the yellow form, which, presumably, is caused by the absence or breakdown of the blue component of the normal green pigment. I published a list of food-plants in 1970 (*Ent. Rec.* 82:272).

Xanthopan morgani Walker. Carcasson's description is a transcript of mine, and the figure is a rather poor reproduction of one of my photographs, which clearly shows the white fuzz of setae. 'Ibaria' is a printing error for 'Uvaria'.

Pseudoclanis postica Walker. The food-plant in East Africa seems to be *Ficus* spp. (Moraceae), although other Moraceae are also quoted. Pinhey's record of *Loranthus* seems doubtful, it would be by no means the first occasion when the parasite has been recorded as the food-plant instead of the host, and *vice versa*. I have recorded the horn as being reddish purple with blue-green tubercles laterally, and the spiracles as being blue with a black rim.

Andriasa contraria Walker. There seem to be considerable differences between East and West African larvae. Mine had the spiracles either blue or bright green, versus the West African yellow, and lacked the 'velvet black patch' at the base of the horn, which in East African larvae is either pale green or yellowish versus bright yellow in West Africa. The generic name is incorrect as '*Adriasa*'.

Cephonodes hylas L. ssp. *virescens* Wallgr. A very variable larva. Full description and figures can be found in Bell & Scott (*Fauna of British India, Moths, 5*). East African food-plants belong to the Rubiaceae, and it can be a pest on Coffee, but *Spathodea nilotica* (Bignoniaceae) is also recorded. The most obvious characteristic is the tuberculate, swollen 'collar' on the somite immediately behind the head, my first, MacNulty's second.

Deilephila nerii L. I am always doubtful of *Gardenia* (Rubiaceae) as a food-plant of this species. It is true that it feeds on *Cinchona* (Rubiaceae), but I think *Gardenia* is more likely to be the Mock Gardenia of gardeners, *Tabernaemontana coronaria* (Apocynaceae), with almost scentless flowers and shiny leaves. In East Africa this is preferred to Oleander (*Nerium*). There are some very doubtful food-plants on record—*Mangifera* (Anacardiaceae), *Jasminum* (Oleaceae) and *Bambusa* (Gramineae)—*Mangifera* is possibly a misidentification of *Conopharynga* and Jasmine for *Landolphia* or *Carissa* (all Apocynaceae), but what has been taken for Bamboo I cannot even guess. South's figure in the first edition of *Moths of the British Isles, I*, shows a larva in the prepupal livery.

Nephele comma Hopffer. In East Africa feeds mainly on *Landolphia* (Apocynaceae). Spiracles of my larvae were blue-grey. If green larvae invariably produced *derasa* and brown *comma*, there would be a good case for considering them two distinct species, but most *Nephele* appear to have a green and a brown larval form, and the Indian *N. didyma* F. also has two forms, one with and one without the silvery stigma.

Nephele accentifera Beauv. Larvae were found in Kampala feeding on the ornamental *Cryptostegia grandiflora* (Asclepiadaceae) but ate *Carissa grandiflora* (Apocynaceae) in captivity. It has also been recorded on *Ficus* spp. (Moraceae). Whilst the larva, as stated by MacNulty, is not unlike that of *comma*, there is a considerable difference between the pupae of the two species, that of *accentifera* having a far more pronounced 'duck's bill' proboscis sheath.

Having always considered the food-plants of *Nephele* as being parallel to those of the Danaidae, i.e. Apocynaceae, Asclepiadaceae and Moraceae, the inclusion of Caesalpiniaceae (*Macrolobium*) and Sapotaceae (*Chrysophyllum*) is somewhat unexpected.

Tennora fumosa Walker. I have since had a dark larva, feeding on an unidentified rubiaceous shrub. *Camellina* is Pinhey's record; what it looks like and to what family it belongs, I do not know.

Sphingonaepiopsis nana Boisd. The larval description appearing under this name in Carcasson, and quoted by MacNulty, applies, unfortunately, to *Sphin-*

gonaepiopsis ansorgei Roths. The mistake arose from the fact that Carcasson had always insisted that *ansorgei* did not occur on the Kenya Coast, and the identity of the bred imagines was never checked against Museum specimens.

The two larvae are very different, that of *S. nana* is very variable with a fairly small, tapering, round horn, whilst that of *S. ansorgei* is invariably blackish, with the horn laterally compressed, giving it the shape of a paddle or a longitudinal section through an Indian club. The larva of *S. ansorgei* is remarkable in that it does not void its frass in the usual pellet form, but in long sticks, often almost an inch in length, the length of frass remaining protruding from the anus until it breaks off. Both species feed on *Oldenlandia* (Rubiaceae).

Basiothia medea F. Kenya larvae are some shade of green or brown. I would describe the markings as black quarter circles above an elliptical pinkish spot. Food-plants are *Pentas* and *Oldenlandia* (Rubiaceae). Although a dusk flyer, imagines emerge from the pupa shortly after dawn.

Basiothia charis Boisd. I have never bred this species, but *Vernonia* (Compositae) to me seems a most unlikely food-plant.

Euchloron megaera L. The ocellus in the green form is divided obliquely, the upper portion bluish-lilac, the lower white. There is no lateral and dorsal pinkish suffusion as suggested by MacNulty. In the brown form, the upper part of the ocellus is blackish, the lower white. It is a strange coincidence that many of the species with an exceptionally short horn in the final instar have a disproportionately long one in the earlier.

Hippotion osiris Dalm. The early instars may be green or brown but, in my experience, the final is always dark. This is another larva with a very long horn in the early instars and a mere pin-point in the final. Seitz's description is almost certainly based on some other species, the minute pin-point horn of *H. osiris* compared to the longish horn of *H. celerio* makes any suggestion of similarity ridiculous. Other recorded food-plants are *Oxygonum* (Polygonaceae) and *Spathodea* (Bignoniaceae). I have never found it on anything but *Impatiens* (Balsaminaceae). It is strange that this species, as well as *H. celerio*, *H. eson* and *H. balsaminae*, should feed on *Ipomaea* (Convolvulaceae) in West Africa but not in East. Is the family Ampelidaceae lacking in West Africa? *Centroctena rutherfordi* Druce is also recorded from *Ipomaea*, whilst its congener *imitans* Butler feeds on *Cissus* and other Ampelidaceae in East Africa.

Hippotion celerio L. Good figures and descriptions are also to be found in Bell & Scott (*Fauna of British India, Moths*, 5). Other recorded food-plants are *Commicarpus pentandrus*, *Boerhavia* (Nyctaginaceae), *Beta* (Chenopodiaceae), *Spermococe* (Rubiaceae), *Gossypium* (Malvaceae), *Cryptocoryne* (Aroidae) and *Zea mays* and *Sorghum* (Gramineae). *Boerhavia*, which belongs to the same family as *Bougainvillea*, is the favourite East African food-plant.

Hippotion eson Cramer. Early instars may be green or brown but, in my experience, the final is always dark brown. I published a list of food-plants in 1970 (*Ent. Rec.* 82:272).

Theretra orpheus H.S. My description differs slightly from that quoted, and is: Head greenish yellow. Body with a dark sepia dorsal stripe, beginning as a line on the 1st somite and broadening to the 4th, and then tapering again to the base of the horn. This stripe containing a blackish median line and with a series of pale V-shaped marks, their apices directed forwards, from the 5th to the 10th somite. The dorsal stripe bordered by a broad whitish stripe shading into very pale pink below, below this again a broad sepia stripe. Venter, legs and prolegs greenish. Thoracic somites with a whitish sublateral stripe. 4th somite with a subdorsal ocellus consisting of a shiny, blackish brown pupil speckled with white,

enclosed in a yellowish ring with a surrounding black line. Spiracle white rimmed with pinkish and with a pinkish transverse band. Horn blackish brown, smooth and shining, carried straight behind with a slight upward curve. Anal flap centred with sepia. It feeds on the roots of epiphytic orchids.

Centroctena rutherfordi Druce. I have not bred this species, but on the analogy of *C. imitans* Butler I agree that there is not likely to be a green form of larva. The description of the larva of *C. imitans*, which was also unknown until recently, is as follows: Head olive-buff, with four short black streaks from the posterior margin and three inverted T-shaped marks on the lower half. 1st and 2nd somites, the lateral area of the 3rd and 4th, as well as the dorsum anteriorly of the 3rd, pale pinkish ivory with a reticulate pattern of black lines. Dorsal area of the 4th, and the posterior portion of the 3rd, somite olive with a central black line, which is continued to the 10th somite and is almost invisible amongst the dorsal striae. The ocellus on the 4th somite large, shining black, with a fine whitish ring, which is, in turn, ringed with blackish. A fine white curved line above the ocellus in the olive dorsal area. Somites 5 to 10 with the dorsal area white, densely, but finely, striated longitudinally with blackish-olive. 11th and 12th somites pinkish, the blackish striae finer and sparser. 5th to 10th somites with a broad white lateral stripe, shading into deep pink above and pale yellow below. The sublateral area grey, minutely streaked with black, and encroaching into the lateral stripe in a series of triangular, backward-directed serrations, the apices of which are continued as a fine black line. Lateral and sublateral areas of somites 11 and 12 similar to the dorsal. Spiracles chalky white. Horn a minute olive-brown tubercle. Legs greyish, the joints black. Prolegs coloured as the sublateral area. Anal claspers as somites 11 and 12. Venter pinkish, streaked and speckled with black. Shape of the 4th somite somewhat swollen, then tapering to the head. A very fine snake-mimic, when the first three somites are retracted.

The early instars are quite different with the head and body pale green. The 4th somite ocellus a black spot encircled by a narrow whitish ring, which is in turn encircled by a wider purplish one. A very fine purple-brown subdorsal line from the ocellus to somite 10, and the lateral area with very fine, oblique, purple-brown lines. Horn long and black. The ocellus and purple-brown lines do not appear until the 3rd instar.

Mombasa, 21st March 1971

The Lepidoptera of Essex. The Essex Naturalists' Trust is preparing a distribution of the Lepidoptera of Essex and are anxious to have the fullest possible coverage. Records are invited and should be sent to either the present writer or to Mr. G. Pyman, 'Treyarnon', The Ridge, Little Baddow, Chelmsford, Essex. For the greatest value records should be as full as possible, but should at least have a locality which can be translated into a 10km square reference, the date of capture (or observation), if not imago, the stage and the collector's name.—F. D. BUCK, 'Seirotana', New Road, Tiptree, Colchester, Essex, 28th January 1971.

SOME ECOLOGICAL OBSERVATIONS ON THE FAUNA IN A TIDAL MARSH TO WOODLAND TRANSITION

By R. E. STEBBINGS

LOCATION

The area examined was the upper estuary of the river Fal about 6·5 km south-east of Truro and one kilometre west of Ruan Lanihorne. The estuary lies in a typical south Cornish ria system with wooded and steeply rising valley sides to about 50 m. Aspect is north-east (landward) to south-west (seaward).

The marsh is approximately 14·5 km from the sea and brackish water of up to 0·20 per cent chlorinity floods it on extreme spring tides. During the past 200 years very rapid silting has occurred owing to the clay workings to the north and west of St. Austell. Large quantities of kaolinitic silt with a substantial quartz fraction was washed down the river Fal and became deposited in its upper estuary. Within the last 200 years the river was tidal to Tregony some 4 km inland from the present high-water mark of ordinary tides. This rapid siltation provided high-level mud flats on which upper estuary salt marsh developed. Succession to tidal woodland was equally rapid and almost 3 km of the woodland in the valley below Tregony is now above the limit of tidal flooding.

METHODS

A detailed levelling survey of this estuary, carried out by the Coastal Ecology Section of the Nature Conservancy in September 1965, was related to Ordnance Datum (Newlyn). This survey measured the heights of the topographical features and also the stem base levels of all plant species encountered. From the results it was found that distinct changes in the zonation occurred at certain levels. Thus it was convenient to divide the marsh into three zones based on levels and faunal sampling was related to them. Vegetation was found to be colonising the mud flats at +1·52 m o.d. and the first zone was +1·50 to 1·90 m. The next zones were +1·91 to +2·30 m and 2·31 m+.

Fauna was collected by sweep netting, butterfly netting, pitfall trapping and hand searching. Collecting was carried out from 28th to 30th June 1966 during very hot and humid weather, and pitfall traps were set between 28th June and 19th July 1966.

HABITAT STRUCTURE AND VEGETATION ZONES

The study area ranged from bare mud (at +1·50 m o.d.) through salt marsh and salt pasture to oak woodland (at +2·60 m o.d.) all of which was subject to periodic tidal flooding. The maximum height to which flooding has been recorded was about +4·20 m o.d. This corresponds to a ground submergence depth of 1·60 m at the marsh-woodland boundary. However, this submergence occurs notably during the highest tides such as the equinoctial tides in March and September and lasts only one to two hours either side of high water. Parts of the marsh remained submerged for much of the year in the form of stagnant pools which were replenished by rain water. These pools were relatively sterile as regards macro fauna and flora and this may have been due to the highly stagnant reducing conditions.

The three zones were typified by a distinct flora. As the level increased so did the number of species and their diversity.

The lowest zone (Zone 1), from which eight plant species were recorded, was dominated by *Puccinellia maritima* (Huds.) Parl. Also locally common were *Agrostis stolonifera* L. and *Scirpus maritimus* L.

The seaward edges were clonal in character with isolated clumps of *Puccinellia* and *Scirpus*. Landward from these *Agrostis stolonifera* was growing, often in pure stands and was particularly dense, matted and hummocky to a height of 50 cm.

In the mid zone (Zone 2), 32 species were found with predominantly *Agrostis stolonifera*, *Scirpus maritimus*, *Juncus maritimus* Lam., *J. effusus* L. and *Festuca rubra* L. It was this zone that contained the stagnant pools with *Scirpus maritimus* as the only emergent species. Parts of this zone were also extremely hummocky up to 60 cm high, caused partially by the occasional grazing by cattle.

The upper zone (Zone 3) included at least 86 plant species with many locally dominant species. The most abundant species and those from which most fauna was collected were: *Agrostis stolonifera*, *Festuca rubra*, *Agropyron repens* (L.) Beauv., *Ahus glutinosa* (L.) Gaert., *Salix atrocinerea* Brot., *Angelica sylvestris* L., *Epilobium angustifolium* L., *Ulex europaeus* L., *Rubus fruticosa* agg. and *Urtica dioica* L. Isolated young trees were growing over much of the marsh upstream from Sett Bridge, and towards the woodland boundary formed scrub areas. The general height of the vegetation increases from about 60 cm through a herb level at 150 cm to scrub rising to about 15 metres.

In addition to the main plant zones (which have been numbered habitats 1 to 3 in the fauna species list), two other habitats were sampled separately. Habitat 4 was the stone wall and causeway known as Sett Bridge, and habitat 5 was the stagnant water pools.

RESULTS

In general the faunal species recorded were representative of any marshland ecosystem in southern Britain and were not indicative of saline or brackish conditions. However, the spider *Erigone longipalpis* Sund. is confined to salt-marshes and the mollusc *Potamopyrgus jenkinsi* (Smith) is invariably found in tidal or brackish pools.

Although the collections were by no means exhaustive it was interesting to note how the number of plant and animal species increased as the level increased. In the lowest zone where eight species were recorded, 48 species of invertebrate were found. The mid zone contained 32:83 plant to animal species and the upper zone 86:142. However, although no measurements of densities were made there was a large increase in population numbers of Hemiptera and Orthoptera as the level increased. Other groups including Araneae did not show any obvious increase in density.

Certain records deserve special note. In September 1965 I found a sizable population of adults with characteristic egg sacs of the spider *Argiope bruennichi* Scop. This animal was first found in the Christchurch (Hampshire) area in 1942 and is now known to be fairly common throughout Bournemouth and around Poole Harbour. The most western previous record was Weymouth. It would be interesting to know whether the Fal has a relic population of this common European species.

Two other county spider records were made in July 1966, a male each of *Araneus gibbosus* Walck. and *Xysticus lanio* Koch, and both these were associated with the lowest seaward zone. Three females of the rare spider *Theridiosoma gennmosum* Koch were found in the marsh-woodland boundary.

The one specimen of the fly *Syntormon mikii* Strobl. was particularly interesting since it is a Mediterranean species, having been recorded from Spain, Corsica, Crete and Greece. It has been found once before in Britain (Collin, 1913, *Ent. mon. Mag.* 49:131).

ACKNOWLEDGMENTS

F. Horsman was responsible for collecting and identifying the Araneae and these were checked by Dr. P. Merrett. I wish to thank Dr. N. W. Moore, Dr. M. Service, R. E. Baker and Mrs. A. F. Stebbings, all of the Nature Conservancy, for identifying or checking part of the collection. I am also particularly grateful to many workers in the British Museum (Nat. Hist.) for identifying much of this material.

RECORDED SPECIES

Habitats: 1. Marsh 1·50–1·90 m o.d. 2. Marsh 1·91–2·30 m o.d. 3. Marsh 2·31+o.d. 4. Stone Wall. 5. Stagnant Water Pools.

	<i>Habitat</i>		<i>Habitat</i>
OLIGOCHAETA		HEMIPTERA (HETEROPTERA)	
<i>Dendrobaena octoedra</i> Savigny	3	<i>Anthocoris nemoralis</i> F.	1
<i>Biomastros eiseni</i> Levinsen	2	<i>Pithanus maerkeli</i> H.-S.	1 & 2
<i>Allolobophorus</i> sp.	3	<i>Calocoris norvegicus</i> Gmel.	1
CRUSTACEA (MALACOSTRACA)		<i>Stenotus binotatus</i> F.	1
AMPHIPODA ISOPODA		<i>Stenodema calcaratum</i> Fall.	3
<i>Gammarus</i> sp.	1 & 4	<i>laevigatum</i> L.	1
<i>Asellus aquaticus</i> Deg.	4	<i>Leptopterna dolabrata</i> L.	1, 2 & 3
<i>Oniscus asellus</i> L.	3	<i>Capsus ater</i> L.	2 & 3
<i>Philoscia muscorum</i> Scop.	3 & 5	<i>Hydrometra stagnorum</i> L.	4
<i>Metoponorthus cinguendus</i> Kinsham	5	<i>Gerris thoracicus</i> Schum.	4
<i>Armadillidium vulgare</i> Lat.	5	<i>gibbifer</i> Schum.	4
<i>Sphaeroma rugicauda</i> Leach		<i>lacustris</i> L.	4
INSECTA		<i>Saldula</i> sp.	1
COLLEMBOLA		<i>Notonecta glauca</i> L.	4
<i>Bourletiella insignis</i> Reut.	1	<i>Corixa nigrolineata</i> Fieb.	4
<i>Sminthurus fuscus</i> L.	4	<i>sahlbergi</i> Fieb.	4
		<i>punctata</i> Ill.	4
OTHOPTERA		HEMIPTERA (HOMOPTERA)	
<i>Pholidoptera griseoaptera</i> Deg.	3	<i>Aphrophora alni</i> Fall.	3
<i>Leptophyes punctatissima</i> Bosc.	2 & 3	<i>Philaenus spumarius</i> L.	2 & 3
<i>Chorthippus parallelus</i> Zett.	2 & 3	<i>Jassus lanio</i> L.	1
		<i>Cicadella viridis</i> L.	2 & 3
		<i>Delphacodes ?pellucida</i> F.	3
ODONATA		EPHEMEROPTERA	
<i>Pyrrhosoma nymphula</i> Sulz.	2 & 3	<i>Ephemera ignita</i> Poda	3
<i>Ischnura elegans</i> v.d. Lind.	2		
<i>Coenagrion puella</i> L.	1, 2 & 3	TRICHOPTERA	
<i>Enallagma cyathigerum</i> Charp.	1, 2 & 3	<i>Limnephilus lunatus</i> Curtis	4
		<i>Leptocerus bilineatus</i> L.	3
<i>Agrión virgo</i> L.	2		
<i>splendens</i> Harris	3	LEPIDOPTERA	
<i>Aeshna cyanea</i> Müll.	2	<i>Pieris rapae</i> L. (6)	3
<i>Sympetrum striolatum</i> Charp.	3	<i>napi</i> L. (7)	3
		<i>Anthocharis cardamines</i> L. (9)	3

	<i>Habitat</i>		<i>Habitat</i>
<i>Maniola jurtina</i> L. (22)	3	<i>Loricera pilicornis</i> F.	
<i>tithonus</i> L. (23)	3	<i>Clivina fossor</i> L.	
<i>Aphantopus hyperantus</i> L. (26)	2 & 3	<i>Bembidion unicolor</i> Chaud.	
<i>Ochlodes venata</i> Br. & Grey (76)	3	<i>lunulatum</i> Geof.	
<i>Notodonta ziczac</i> L. (110)	3	<i>Pterostichus vernalis</i> Panz.	
<i>Callimorpha jacobaeae</i> L. (191)	3	<i>nigra</i> Schal.	3
<i>Euclidimera mi</i> Clerck (615)	3	<i>nigrita</i> F.	3
<i>Epirrhoe alternata</i> Müll. (795)	3	<i>anthracinus</i> Ill.	1, 2 & 3
<i>Agriphila culmella</i> L. (1139)	3	<i>strenuus</i> Panz.	1, 2 & 3
<i>diligens</i> Sturm.		<i>diligens</i> Sturm.	1, 2 & 3
DIPTERA		<i>Agonum viduum</i> Panz.	3
<i>Tipula lateralis</i> Meig.		<i>moestum</i> Duft.	3
<i>Limonia morio</i> F.		<i>marginatus</i> L.	3
<i>Limnophila discicollis</i> Meig.		<i>ruficorne</i> Goeze	3
<i>Erioptera stictica</i> Meig.		<i>fuliginosus</i> Panz.	3
<i>Anisopus fenestralis</i> Scop.		<i>Dromius linearis</i> Ol.	2
<i>Pericomia trivialis</i> Eaton		<i>Hygrotus inaequalis</i> F.	4
<i>Chaoborus crystallinus</i> Deg.		<i>Hydroporus planus</i> F.	2 & 4
<i>Mochlonyx culiciformis</i> Deg.		<i>Agabus sturmii</i> Gyll.	4
<i>Chironomus</i> sp.		<i>bipustulatus</i> L.	4
<i>Culicoides obsoletus</i> Meig.		<i>Ilybius fuliginosus</i> F.	4
<i>punctatus</i> Meig.		<i>Colymbetes fuscus</i> L.	4
<i>Bibio hortulanus</i> L.		<i>Dytiscus semisulcatus</i> Müll.	4
<i>Sciara</i> sp.		<i>marginalis</i> L.	4
<i>Chloromyia formosa</i> Scop.		<i>Gyrinus natator</i> L.	4
<i>Rhagio scolopacea</i> L.		<i>Ochthebius viridis</i> Peyron	4
<i>Haematopota pluvialis</i> L.		<i>Hydraena riparia</i> Kug.	2
<i>Tabanus bromius</i> L.		<i>Helophorus brevipalpis</i> Bedel	1
<i>Dioctria linearis</i> F.		<i>walkeri</i> Sharp	4
<i>Empis livida</i> L.		<i>Cercyon lugubris</i> Ol.	4
<i>Dolichopus nubilus</i> Meig.		<i>atomarius</i> F.	4
<i>Syntormon mikii</i> Strobl.		<i>Hydrobius fuscipes</i> L.	4
<i>Eutarsus auriculus</i> Meig.		<i>Anacaena globulus</i> Payk.	4
<i>Megaselia</i> sp.		<i>limbata</i> F.	4
<i>Eristalis tenax</i> L.		<i>Enochrus bicolor</i> F.	2
<i>Helophilus pendulus</i> L.		<i>Necrophorus interruptus</i> Steph.	3
<i>Syritta pipiens</i> L.		<i>vespillo</i> L.	3
<i>Xanthogramma pedissequum</i> Harris		<i>Catops coracinus</i> Kellner	3
<i>Syrphus luniger</i> L.		<i>Sciodrepa watsoni</i> Spence	3
<i>Rivellia syngenesiae</i> F.		<i>Oxytelus rugosus</i> F.	3
<i>Nemopoda nitidula</i> Fall.		<i>Stenus juno</i> Payk.	3
<i>Sepsis punctum</i> F.		<i>nitidiusculus</i> Steph.	3
<i>Tetanocera elata</i> F.		<i>bifoveolatus</i> Gyll.	3
<i>Drosophila</i> ? <i>simulans</i>		<i>Paederus riparius</i> L.	1 & 2
<i>Oscinella</i> ? <i>hortensis</i>		<i>Xantholinus fracticornis</i> Müll.	1
<i>Cetema neglecta</i>		<i>Philonthus fuscipennis</i> Mann.	3
<i>Scatophaga stercorarium</i> L.		<i>Staphylinus caesareus</i> Ceder.	3
		<i>parumtomentosus</i>	
COLEOPTERA		<i>Stein.</i>	3
<i>Elaphrus uliginosus</i> F.	1	<i>Quedius fuliginosus</i> Grav.	3
<i>cupreus</i> Dufts.	2		

Habitat

<i>Tachyporus chrysomelinus</i> L.	2
<i>formosus</i> Matthews	2
<i>Tachinus rufipes</i> Deg.	3 & 4
<i>Atheta</i> sp.	2 & 3
<i>Aleochara lanuginosa</i> Grav.	3
<i>Lampyris noctiluca</i> L.	2 & 3
<i>Cantharis fulvicollis</i> F.	1
<i>fulvicollis</i> v.	
<i>flavilabris</i> Fall.	1
<i>thoracica</i> Ol.	1
<i>Rhagonycha fulva</i> Scop.	2 & 3
<i>testacea</i> L.	3
<i>Cytillus sericeus</i> Forst.	3
<i>Atomaria atricapilla</i> Steph.	3
<i>Subcoccinella</i>	
<i>vigintiquattuorpunctata</i> L.	2
<i>Coccidula scutellata</i> Herbst.	3
<i>Coccinella septempunctata</i> L.	3
<i>Propylea quatuordecimpunctata</i> L.	1, 2 & 3
<i>Geotrupes stercorosus</i> Scriba	2
<i>Leptura maculata</i> Poda	3
<i>Clytus arietis</i> L.	3
<i>Hapsidolema cyanella</i> L.	2 & 3
<i>melanopa</i> L.	2 & 3
<i>Phaeton armoraciae</i> L.	1
<i>Galerucella lineola</i> F.	3
<i>tenella</i> L.	3
<i>Aphthona nonstriata</i> Goeze	3
<i>Crepidodera transversa</i> Marsh.	3
<i>aurata</i> Marsh.	3
<i>Apion loti</i> Kirby	3
<i>viciae</i> Payk.	2
<i>dichroum</i> Bedel	1
<i>Polydrusus cervinus</i> L.	4
<i>Sitona cambricus</i> Steph.	2 & 3
<i>lineatus</i> L.	2 & 3
<i>flavescens</i> Marsh.	3
<i>Curculio pyrrhoceras</i> Marsh.	3
<i>Hypera rumicis</i> L.	
<i>Ceuthorhynchus floralis</i> Payk.	1
<i>pollinarius</i> Forst.	3
<i>contractus</i> Marsh.	1
<i>Nanophyes marmoratus</i> Goeze	3

HYMENOPTERA

<i>Eutomostethus luteiventris</i> Klug	3
<i>Pachynematus kirbyi</i> Dalbom	
2 & 3	
<i>Pristiphora</i> sp.	3
<i>Ichneumon</i> sp.	3

Habitat

<i>Ctenichneumon castigator</i> F.	3
<i>Stenolabus vitratorius</i> Grav.	3
<i>Tryphon</i> sp.	3
<i>Rhorus</i> sp.	3
<i>Synergus reinhardi</i> Mayr.	
<i>Myrmica ruginodis</i> Nyl.	3
<i>scabrinodis</i> Nyl.	3
<i>Lasius fuliginosus</i> Lat.	
<i>niger</i> L.	2 & 3
<i>Vespula vulgaris</i> L.	
<i>rufa</i> L.	3
<i>Rhopalum clavipes</i> L.	3
<i>Andrena nana</i> Kirby	2 & 3
<i>Bombus terrestris</i> L.	2 & 3
<i>agrorum</i> F.	2 & 3
<i>Apis mellifera</i> L.	2 & 3

ARACHNIDA

ACARINA	
<i>Poecilocirus necrophor</i> Vitz.	
<i>Macrocheles</i> near <i>glaber</i> . Müll.	
<i>Balaustrium</i> (s.l.) sp.	
<i>Johnstoniana errans</i> Johnston	
<i>Calyptostoma velutinum</i> Müll.	
ARANAE	
<i>Dictyna arundinacea</i> L.	3
<i>Zelotes latreillei</i> Simon	2 & 3
<i>Clubiona reclusa</i> O.P. Cambridge	3
<i>stagnatilis</i> Kulczynaki	
1 & 3	
<i>lutescens</i> Westring	3
<i>Misumena vatia</i> Clerck	3
<i>Xysticus cristatus</i> Clerck	3
<i>lanio</i> Koch	1
<i>Philodromus dispar</i> Walck.	
<i>Heliophanus cupreus</i> Walck.	3
<i>Lycosa pullata</i> Clerck	2 & 3
<i>prativaga</i> Koch	1, 2 & 3
<i>armentata</i> Clerck	1, 2 & 3
<i>nigriceps</i> Thorell	2
<i>Trochosa terricola</i> Thorell	1, 2 & 3
<i>Arctosa leopardus</i> Sundevall	2
<i>Pirata piraticus</i> Clerck	1, 2 & 3
<i>hygrophilus</i> Thorell	2
<i>Pisaura mirabilis</i> Clerck	1, 2 & 3
<i>Agelena labyrinthica</i> Clerck	3
<i>Theridion simile</i> Koch	3
<i>ovatum</i> Clerck	3
<i>bimaculatum</i> L.	3

	Habitat		Habitat
<i>Robertus lividus</i> Black.	2	<i>Bathyphantes approximatus</i>	
<i>Tetragnatha extensa</i> L.	1 & 3	O.P. Cambridge	2 & 3
<i>montana</i> Simon	3	<i>gracilis</i> Black.	
<i>Pachygynnatha clercki</i> Sundervall			1, 2 & 3
	1 & 3	<i>Lepthyphantes tenuis</i> Black.	1 & 3
<i>Meta segmentata mengei</i> Black.	3	<i>peltata</i> Wider	3
<i>Araneus gibbosus</i> Walck.	1	<i>Linyphia triangularis</i> Clerck	3
<i>diadematus</i> Clerck	1		
<i>cornutus</i> Clerck	1, 2 & 3	MOLLUSCA GASTROPODA	
<i>cucurbitinus</i> Clerck	3	PECTINIBRANCHIA	
<i>Theridiosoma gemmosum</i> Koch	3	<i>Potamopyrgus jenkinsi</i> Smith	1
<i>Argiope bruennichi</i> Scop.	2 & 3		
<i>Gnathonarium dentatum</i> Wider		PULMONATA	
	1 & 2	<i>Limnaea truncatula</i> Müll.	4
<i>Hypomma bituberculatum</i> Wider	1	<i>Planorbis spirorbis</i> L.	4
<i>Pocadicnemis pumila</i> Black.	3	<i>Succinea putris</i> L.	4
<i>Oedothorax fuscus</i> Black.	1 & 2	<i>Vertigo pygmaea</i> Draparnaud	5
<i>retusus</i> Westring	2 & 3	<i>Lauria cylindracea</i> da Costa	5
<i>Lophomma punctatum</i> Black.	2 & 3	<i>Balea perversa</i> L.	5
<i>Diplocephalus permixtus</i>		<i>Clausilia bidentata</i> Ström.	5
O.P. Cambridge	1 & 3	<i>Hygromia hispida</i> L.	5
<i>Erigone dentipalpis</i> Wider	1 & 3	<i>Cepaea nemoralis</i> L.	5
<i>atra</i> Black.	1, 2 & 3	<i>Helix aspersa</i> Müll.	5
<i>longipalpis</i> Sundervall	1 & 2	<i>Euconulus fulvus</i> Müll.	5
		<i>Oxychilus cellularius</i> Müll.	5

PROCEEDINGS

25th MARCH 1971

The President, Col. A. M. EMMET, in the Chair

The President welcomed to the meeting Dr. de Jong from Holland and Mr. Alan Creaser, Secretary of the Lancashire and Cheshire Entomological Society.

EXHIBITS

Col. A. M. EMMET—Examples of the mines of the eight British birch-feeding species of Nepticulidae (Lep.), commenting on the points of distinction.

Mr. R. W. J. UFFEN—Hawthorn twigs containing pupae of *Spuleria flavicaput* Haw. (*Chrysoclista aurifrontella* Hübn.) (Lep., Cosmopterygidae) taken by the President at Saffron Walden, Essex. Mr. Uffen found that the black elongate holes from which the moth emerges and from which the larva extrudes its frass are always on the underside of the twigs, where they are easily overlooked.

Mr. T. J. G. HOMER—A series of Sphingidae and Noctuidae, and a butterfly from Colombia.

Mr. A. E. GARDNER—A series of *Epurea distincta* (Grimmer) (Col., Nitidulidae) bred from the Tinder Bracket fungus, *Fomes igniarius* (L.) Fr. found on alder at

Leckford, N. Hants, 14.iii.71. This species was added to the Hampshire list by Mr. S. A. Williams who found two examples in dry litter in the same locality in 1969.

COMMUNICATIONS

Details were given of unsuccessful attempts by J. E. COOPER to assemble the Pepper Tree moth, *Nudaurelia krucki* Hering (Saturnidae).

Mr. M. P. CLIFTON reported a young pyrrhocorid bug found feeding on a dead fly on a recent collecting trip to the Karure Forest, near Nairobi, Kenya. As far as Mr. Clifton knows this is the first record of a member of this group of Hemiptera feeding on anything other than plant sap. The fly, a muscid, appeared to have been knocked down by rain the day previously, and it was in a small depression on the path which was still damp. To check whether the bug was actually feeding on the fly, it was moved slightly three times, until it was out of the depression; the bug moving away each time and then returning to the fly, not to the damp depression. Finally the proboscis was seen to enter the fly. Both the fly and the bug were collected in spirit and are now in the collection of the National Museum, Nairobi.

Dr. C. G. M. DE WORMS reported two *Dasyycampa rubiginea* Schiff. (Lep., Noctuidae).

A talk was given by Dr. C. G. M. de Worms, illustrated by slides, entitled 'South and East Africa Revisited'.

22nd APRIL 1971

The President, Col. A. M. EMMET, in the Chair

The death was announced of Capt. J. Ellerton, R.N.

EXHIBITS

Mr. F. D. BUCK—An example of *Trigonogenius globulus* Solier (Col., Ptinidae) poured from a bottle of Piesporter on 4.iv.71. It was quite dead and perfectly relaxed, and had obviously been inside the bottle. It was suggested that it entered the bottle with the cork.

Mr. A. E. STUBBS—Two species of *Elachiptera* (Chloropidae) from Leckford, N. Hants, 19.iii.71. *E. brevipennis* (Meig.), a species with reduced or absent wings, found in dead grass tufts in fenland. The series illustrated a range of variation. *E. uniseta* Collin, a rare species with fully developed wings, originally described from five examples reared from a Reed Bunting's nest found in Black Park, Bucks. The British Museum (Nat. Hist.) has three examples from Orford, Suffolk, and Mr. P. J. Chandler has taken it at Old Slade Nature Reserve, Bucks. The single example exhibited was swept from *Carex* growing in a fenland ditch.

Mr. N. TUROK—*Stenus guynemeri* du Val. (Col. Staphylinidae) taken at Langdale, Ambleside, Lancs.

Mr. T. N. D. PEET—A case of *Charaxes* butterflies taken in Uganda over the past year, mostly on bait of rotten pineapple or banana.

Mr. E. S. BRADFORD—(1) A leaf of *Quercus ilex* L. containing a larva of *Stigmella suberivora* Staint. (Lep., Nepticulidae) from Folkestone, Kent, 5.iv.71. (2) The lichen *Lepraria incana* (L.) Ach. (*Lepraria (Crocyenia) aeruginosa* auct.), the pabulum of *Infurcitinea argentinaculella* Staint. (Lep. Tineidae), from Folkestone, Kent, 4.iv.71.

Dr. J. NEWTON—An undetermined Cicada (Hem., Cicadidae) from Singapore.

Mr. P. A. BOSWELL—Workers of the ant *Leptothorax nylanderi* (Först.) from Wisley Heath, Surrey, 18.iv.71, found nesting in the bark of a conifer stump.

COMMUNICATIONS

Col. A. M. EMMET said his *Spuleria flavicaput* Haw. (Lep., Cosmopterygidae) had emerged in some numbers, among them being a parasite. However, Mr. E. S. BRADFORD has some larvae indoors, but as yet none had come out.

Commenting on the season Dr. C. G. M. DE WORMS said that he had recently been in the Lake District with Mr. J. L. Messenger and in spite of the nights being cold and clear there were plenty of insects at light. In Surrey on 24th April he had noted *Odontosia carmelita* Esp. (Lep., Notodontidae), and he further reported *Polyptychus ridens* F. (Lep., Thyatiridae) to be numerous. He added that in Wiltshire *Celastrina argiolus* L. (Lep., Lycaenidae) had been noted on 13th April and had also been seen in Huntingdonshire the previous week. On the outskirts of the New Forest *Anthocharis cardamines* L. (Lep., Pieridae) had been reported.

Referring to his comments on 25th February (p. 42) on the microlepidoptera in spruce shoots Col. A. M. Emmet said that the Rev. D. J. L. Agassiz had suggested, after consulting a paper by Friese, that it was not possible for any of the larvae to be *Blastotere illuminatella* Zell. (Lep., Yponomeutidae). However, said Col. Emmet, four moths had emerged; two answered the description of *B. illuminatella* and two that of *B. glabratella* Zell; but the Rev. Agassiz had pointed out there were two other continental species in the genus which might be expected to occur in this country and there may well be some confusion over our species.

A report was given by Mr. A. E. Stubbs on a recent meeting of the Joint Committee for the Conservation of British Insects in which he said two sites were causing the Committee some concern. (1) Staines Moor on which gravel extraction was proposed; and (2) an area near the Seven Sisters on the Sussex coast where a large country park was proposed. An appeal was made to all members for details of any rare species in these areas. In the case of the latter site efforts were being made to protect areas of high entomological value.

With reference to Mr. Buck's exhibit, Mr. S. N. A. JACOBS said he had seen this species in some numbers at the head of grain elevators in the London Docks, in bags of dust. Mr. BUCK said this is what he believed to be a normal type of habitat, adding that Mr. S. Wakely used to take this insect in a printing works in Finsbury, and he himself had obtained it in another printing works in Holborn. In each case dusty situations provided the habitat. This he believed would be the kind of conditions in a wine bottler's cork store and it was possible that the beetle was infesting this particular store and could thus have been on the cork when inserted into the bottle.

The exhibit of the *Charaxes* prompted a member to point out that the European species *C. jasius* L. would come to ripe figs and was possibly just as susceptible to offal as its African congenors.

Surprise was expressed by Col. Emmet that Mr. Bradford's *Stigmella suberivora* Staint. were still feeding. His moths had begun to emerge on 4th April, and now all, some 15 examples, had emerged. There were no parasites. He added that half the cocoons were pinkish and the others were white.

A talk was given by Mr. M. CLIFTON, 'Life in East Africa', which he illustrated with coloured transparencies, and which was followed by a discussion.

13th MAY 1971

A Vice-President, Dr. B. J. MACNULTY, in the Chair

The following new members were declared elected: Margaret Noble, Mr. T. H. Fisher, Mr. A. F. C. Gisborne, Mr. J. A. G. Milne, Mr. W. G. Kettle, Mr. A. C. Pont and Mr. J. Porter.

EXHIBITS

Mr. J. M. CHALMERS-HUNT—A post-hibernation larva of *Coleophora tricolor* Wals. (Lep., Coleophoridae) now feeding on grass; in the autumn it was feeding on *Acinos arvensis* (Lam.) Dandy (Basil-thyme).

Mr. A. E. STUBBS—*Limnophila* (*Idioptera*) *pulchella* Meig. (Dipt., Tipulidae). A cranefly showing marked sexual dimorphism, the male having a predominantly yellowish body and normal wings, while the female is black with very short wings. The specimens were taken at Warmwell, Dorset, 27.iv.71. This is a local species recorded mostly from northern counties. The only published record for the south appears to be for the New Forest, though the exhibitor has taken it at Thursley, Surrey.

Mr. E. S. BRADFORD—*Geotrupes stercorarius* (L.) (Col., Scarabaeidae) colloquially known as the 'Lousy Watchman', the mites with which the specimen was infested illustrating the reason for its popular name. The example came from Boreham Wood, Herts.

Mr. R. I. VANE-WRIGHT—Examples of *Antirrhoea* (Lep.), showing a remarkable range of scent organs, including a specialised area on the forewings with reduced scales.

Mr. D. A. BOSWELL—Workers of *Myrmecina graminicola* (Lat.) (Hym., Formicidae), taken in the Gully, Durdham Down, Bristol, 2.v.71.

Mr. A. E. GARDNER—The following carabid Coleoptera taken in flood refuse from the Oberwater, New Forest, Hants, 24.iv.71: *Elaphrus uliginosus* F. and *Trechoblemus micros* (Herbst). Both these species appear to be new records for the New Forest.

COMMUNICATIONS

In his remarks on the Lepidoptera of the season Dr. C. G. M. DE WORMS said that in the New Forest, Hants, the previous week-end *Anthocharis cardamines* L. (Pieridae) was abundant and that *Celastrina argiolus* L. (Lycaenidae) was common. *Mimas tiliae* L. and *Hyloicus pinastri* L. (Sphingidae) had both been taken at mercury vapour light, and *Cerura vinula* L. and *Harpyia firuncula* (Notodontidae) and *Semiothisa liturata* Clerck (Geometridae) had been seen.

During the past week or so at Arundel, Sussex, reported Mr. M. CLIFTON, the Squacco Heron (*Ardeola ralloides* Scop.) had been seen.

On the slope near the station at Sandy, Beds., Mr. R. W. J. Uffen had seen, during the winter, some cases of *Coleophora saturatella* Staint. (Lep., Coleophoridae) in the broom. On the evening of 12th May he had found a single case containing a living larva, but could find no more. He had swept the broom and had a quantity of sweepings hoping he would rear some more; but the infestation of the plants with other micros is severe. The existence of this particular coleophorid should be more apparent on the site in another two weeks or so.

Mr. G. PRIOR said that his light in Park Wood, Ruislip, Middx. recently produced *Lithina chlorosata* Scop. (Lep., Geometridae) and Mr. R. F. BRETHON also reported it from his mercury vapour light at Birtley Green, Surrey.

A talk on 'The Stereoscan and its applications to the study of insects' was given

by Mr. R. I. VANE-WRIGHT. The talk was illustrated by slides of the equipment and of photomicrographs produced by it and was followed by a lively discussion.

27th MAY 1971

A Vice-President, Dr. B. J. MACNULTY, in the Chair

EXHIBITS

Mr. B. GOATER—Empty pupa cases of *Aegeria tipuliformis* Clerck (Lep., Sesiidae) in situ in stems of blackcurrant from Bushey, Herts.

Mr. M. SHAFFER—An example of a tenebrionid beetle, *Tentyria sypria* Kraatz found in a street in New Malden, Surrey, 27.v.71. It was determined by Mr. J. D. Brendell of the British Museum (Nat. Hist.) who suggested it may have been brought over with vegetables or fruit which are being imported in large quantities this year from Cyprus.

He also showed an example of the narcissus fly, *Merodon equestris* F. v. *narcissi* (F.) (Dipt., Syrphidae), found on 23.v.71 at New Malden. The larvae were found to be attacking daffodil bulbs.

COMMUNICATIONS

Mr. E. P. WILTSHIRE reported having captured six examples of *Spialia sertorius* Hoffmannsegg (Lep., Hesperiidae) on chalk slopes at Rogerville on the outskirts of Le Havre, France, 9 & 19.v.71. Higgins & Riley (1970, *A Field Guide to the Butterflies of Britain and Europe*, p. 324) state that this skipper butterfly is absent from north France. This capture, is, therefore, of interest as it shows that *S. sertorius* does in fact reach the English Channel in the Seine area. The nearest previous record in France known to Mr. Wiltshire is the Forest of Vaudreuil, just south of Rouen and the Seine valley, made in 1903 by L. Dupont. Its habitat appears to be restricted.

A talk 'Butterflies and Flowers in the Pyrenees' was given by Mr. M. W. F. Tweedie, which he illustrated with coloured transparencies.

10th JUNE 1971

The President, Col. A. M. EMMET, in the Chair

The following new members were declared elected: Messrs. A. C. E. Allen, L. P. Muirhead, P. Whitton and M. R. Young.

EXHIBITS

The PRESIDENT—A living nepticulid (Lep.) new to the British List, *Dechtria spinosella* Joan. The mines of this species were first taken by Mr. S. N. A. Jacobs near Torquay, Devon, but not recorded. Two years ago the exhibitor found mines in the leaves of *Prunus spinosa* L. at Benfleet, Essex; and last year mines containing larvae were obtained from the same locality. These were now emerging, the exhibited specimen coming out on 5th July. The larvae spun up in four conditions: on tissue lining the container, in sawdust, in a mixture of peat and sand, and in sphagnum. It was from this last that the moths were emerging; to date none had emerged from any of the other conditions.

Dr. C. G. M. DE WORMS—A living larva, fairly full-fed, of *Papilio alexanor* Esp. from Greece.

Mr. A. E. STUBBS—Two species of uncommon Diptera. (1) *Bibio venosus* Meig. (Bibionidae). A male and female taken 1.v.71 in Windsor Forest, Berks. Females were swept from woodland rides whilst the males were on the wing eight feet or more above the ground. (2) *Chyliza extenuata* Rossi (Psilidae). Two males from Leckford, N. Hants, 4.iv.71. They were swept about the base of a hedge at the edge of chalk grassland containing their food-plant, broomrape. Collin says the larvae live in the swollen underground stem of *Orobanche rapum-genistae* Thuill, though *O. elatior* Sutton is the commonest species in this locality. Collin records the species from Hants, Surrey, Suffolk and Co. Wicklow; it must clearly be very local in view of the scarcity of good stands of broomrape.

Mr. D. O. CHANTER—(1) Black and white photographs of West African Lepidoptera: *Herse convolvuli* L. (Sphingidae), feeding at a spider lily; and a larva of *Lachnocnema bibulus* F., a predatory lycaenid, feeding an ant. (2) Examples of four colour forms of the African butterfly *Acraea encedon* L., together with breeding data which suggests that the forms *infuscata* and *com-mixta* may be genetically linked.

Mr. A. E. GARDNER—The following Coleoptera: (1) Living examples of *Hylobius abietis* (L.) (Curculionidae) from the New Forest, Hants, 6.vi.71. (2) A series of *Mordella aculeata* L. (Mordellidae) found in numbers on the flowers of *Ranunculus* near Fareham, S. Hants, 4.vi.71. (3) A series of *Trichophya pilicornis* (Gyll.) (Staphylinidae) found between pine planks in the New Forest, 5.vi.71. This species, associated with pine and sawdust from freshly cut trees, has been increasingly scarcer during the last two decades.

Mr. E. S. BRADFORD—Larvae of what was thought to be *Coleophora peribenanderi* Toll., taken at Chestfidd, Kent, 29.v.71, feeding on *Carduus acanthoides* L.

COMMUNICATIONS

An extract from *Habitat* was read by Mr. G. PRIOR giving details of a directive issued to the Forestry Commission proscribing the felling of deciduous and ornamental trees in the New Forest except under particular circumstances.

Attention was drawn to an investigation into land held by the Ministry of Defence. Suggestions were invited regarding release or otherwise of land held by this Ministry. Contact should be made with the Information Office of the Council for Nature.

Commenting on Mr. Bradford's exhibit, Col. A. M. EMMET said *Coleophora therinella* Tengst, a closely allied species, feeds in spring; *C. peribenanderi* Toll does not.

A paper was given by Prof. P. M. SHEPPARD on 'The Control of Pupal Colour in some Papilios' which he illustrated with slides.

24th JUNE 1971

The President, Col. A. M. EMMET, in the Chair

EXHIBITS

The PRESIDENT—Six species of microlepidoptera taken in the Burren, Co. Clare, during May 1971: *Nepticula dryadella* Hof. and *Trifurcula griseella* Wolff (Nepticulidae), *Coleophora pappiferella* Hof. (Coleophoridae), *Scrobipalpa*

murinella H.-S. (Gelechidae), *Epinotia nemorivaga* Tengst. and *Olethreutes arbutella* L. (Olethreutidae).

Mr. R. W. J. UFFEN—*Hypercallia citrinialis* Scop. (Lep., Oecophoridae) taken in the Burren, Co. Clare, where it was feeding on Milkwort.

Mr. A. E. GARDNER—A series of *Pycnomerus fuliginosus* Er. (Col., Colydiidae) taken under a birch bark in Epping Lower Forest, 13.vi.71.

COMMUNICATIONS

Concerning Col. Emmet's remarks during the previous meeting (p. 93), Mr. R. W. J. UFFEN said that he had noted the odd example of *Coleophora periben-anderi* Toll. (Lep., Coleophoridae) feeding in the spring; he had no direct knowledge of *C. therinella* Tengst.

Mr. F. D. BUCK said that on 31.v.71 he was working tidal litter on Colne Point, Essex, in which he found a number of examples of *Leptothorax nylanderi* (Först.) (Hym., Formicidae). At the meeting of 22nd April (p. 90) Mr. P. A. Boswell exhibited the species from under bark. It was Mr. Buck's experience till that time that the species occurred only under bark.

This year, in the opinion of Col. A. M. EMMET, must be exceptionally good for *Nepticula sorbi* Staint. (Lep., Nepticulidae) which mines the leaves of *Sorbus aucuparia* L. He had seldom seen so many. However, it was nearing the end of its season and he expected that in a week or so it would disappear.

A talk was given by Mr. R. Harris on 'Freeze Drying in Exhibition and Research' which he illustrated with freeze-dried specimens and slides of apparatus and examples of work. The talk was followed by an interesting discussion.

8th JULY 1971

The President, Col. A. M. EMMET, in the Chair

EXHIBITS

Col. A. M. EMMET—(1) A living larva of *Stigmella paradoxa* Frey (Lep., Nepticulidae) feeding in hawthorn, taken at Wicken Fen, Cambs. Other localities recorded for the species are: Chippenham Fen and Madingley, Cambs. and the Burren, Co. Clare, Ireland. (2) Larvae taken at Chippenham Fen, 4.vi.71, which were thought might be *Caloptilia hemidactyl ella* F. A possible alternative might be *C. rufipennella* Hübn, a continental species as yet unrecorded in the British Isles. The larvae were in cones on sycamore leaves and three had been found; also one presumed to be a cocoon. Since they had been taken one had spun up and another was in the process of doing so.

Mr. C. O. HAMMOND—(1) Three examples of *Merodon equestris* F. (Dipt., Syrphidae) to show extreme variation unusual in Diptera. (2) Females of *Psilota anthracina* Meig. (Dipt., Syrphidae), a very rare fly, closely resembling a small bluebottle, taken in Richmond Park, 3.vi.71, a new county record for Surrey. As in Windsor Forest, the species was taken at hawthorn blossom.

Mr. A. E. STUBBS—Three species of rare syrphids (Diptera): a male *Xylota lenta* Meig., Foxhold, Newbury, Berks., 17.vi.71, sitting at the base of a partially dead beech tree; a male *Brachyopa insensilis* Collin, Wisley Common, Surrey, 28.v.71, on an elm trunk seepage where larvae (almost certainly of this species) were also found; a female *Brachyopa pilosa* Collin, South Hawk, Godstone,

Surrey, 31.v.71, crawling from shaded grass at mid-day and probably breeds in dead beech trees at least 200 yards away.

Mr. A. E. GARDNER—The following species of Coleoptera: *Oedemera nobilis* (Scop.) (Oedemeridae) from West Wittering, Sussex, 2.vii.71; *Mycetoporus clavicornis* Steph. (Staphylinidae), *Melandrya caraboides* (L.) (Melandryidae) and *Axinotarsus marginalis* Lap. (Malachiidae) from the Forest of Bere near Fareham, Hants, 2.vii.71; *Synchita humeralis* (F.) (Colydiidae), *Laemophloeus bimaculatus* (Payk.) (Cucujidae), *Tillus elongatus* (L.) (Cleridae) and *Tomoxia biguttata* (Gyll.) (Mordellidae) from beech, *Mycetophagus quadriguttatus* Müll. (Mycetophagidae) from beefsteak fungus, *Ctesias serra* (F.) (Dermestidae) on beech at night, *Pseudocistela cerambooides* (L.) dug out of rotten beech, *Apion scutellare* Kirby (Curculionidae) swept from dwarf furze, *Stenochorus meridianus* (L.) and *Leptura sexguttata* F. (Cerambycidae) on flowers of wild rose, *Leiopus nebulosus* (L.) (Cerambycidae) on beech and *Criocephalus ferus* Muls. (Cerambycidae) evening flight from the New Forest, Hants, 3–4.vii.71.

COMMUNICATIONS

Mr. J. LABDON reported the occurrence of *Trisateles emortualis* Schiff. (Lep., Noctuidae) at mercury vapour light at Peas Pottage, Sussex.

A letter, from Mr. W. St. J. Wildridge, was read reporting a good year for *Strymonidia pruni* L. (Lep., Lycaenidae) in Bucks. He also recorded *Anthocharis cardamines* L. and *Gonepteryx rhamni* L. (Lep., Pieridae) in flight in July. Both Mr. A. E. STUBBS and Mr. R. F. BRETHERTON said they had noticed *G. rhamni* L. in flight during the current month.

Adding to the Burren information given at the last meeting, Mr. R. W. J. Uffen said the plants of Golden Rod (*Solidago virgaurea* L.) from that part of Ireland were quite unlike those we know from the south and south-east of England, having tough, thick leaves and short stalks. He had gathered some to feed *Coleophora ramosella* Zell. (Lep., Coleophoridae) and had sleeved some upon the plants. Examining them a week or so ago he found the plants doing very badly. In the crevices at the woody base of the plants and in the soil he found tiny larvae, the progeny of *Pyrausta funebris* Stroem. (Lep., Pyralidae). When given English Golden Rod they attacked the leaves near the base and killed the plant. Believing the larvae to be in danger of running out of food, they were given Michaelmas Daisy leaves. These they refused when fresh, but some 24 hours later they attacked these plants and have now fed to nearly full growth on stale Michaelmas Daisy. It would now be of interest to see how our English *P. funebris* feed. Mr. Uffen suspects they feed quite low down on the plant.

Mr. S. N. A. JACOBS remarked that *Stigmella paradoxa* Frey. could be confused with a sawfly, though he thought the mines looked different from those of the sawfly. One of the cocoons of the other insect, the larger, he thought looked remarkably like a braconid.

Slides were shown by Messrs. P. A. GODDARD, E. S. BRADFORD, M. W. F. TWEEDIE and C. O. HAMMOND.

22nd JULY 1971

The President, Col. A. M. EMMET, in the Chair

The following new members were declared elected: Messrs. L. H. Evans, Kean Seng and J. Wilton.

EXHIBITS

Col. A. M. EMMET—(1) Two examples of *Pieris napi* L. (Lep., Pieridae); one from West Galway, Ireland, with a very distinct yellow colour, sometimes called form *hibernica* Schmidt, and the other a typical form for comparison. E. S. A. Baynes says there are two kinds of yellow form; one the result of temperature variation, and the other the result of inbreeding. Feral yellow forms are quite scarce. (2) A series of microlepidoptera leaf mines in hawthorn: (a) to illustrate the difficulty in determining the colour of leaf-mining larvae; (b) *Nepticula pygmaeella* Haw. (Nepticulidae); (c) *Scythropia crataegella* L. (Yponomeutidae); (d) *Bucculatrix crataegi* Zell. (Lyonetiidae); (e) *B. crataegi* and *S. crataegella* in the same leaf; and (f) *B. crataegi* and *N. pygmaeella* in the same leaf. (3) A living example of *Coleophora laripennella* Zett. (Lep., Coleophoridae) which emerged that day. The species is one of a group of coleophorid *Atriplex* seed feeders, and is a species which probably only occurs in the Breck district of East Anglia; it appears to be the least common of this group in the genus. Searching with Mr. J. M. Chalmers-Hunt for this species produced only *C. clypeiferella* Hofm., but afterwards cases of *C. laripennella* appeared amongst both their captures of *C. clypeiferella*. A similar thing happened when working with Mr. R. W. J. Uffen. *Coleophora laripennella* was found, 17.vii.71, freshly emerged flying freely. The normal habit of the larva is to overwinter in the debris at the base of the plant and climb up in the spring, but this year there were no signs of the cases. It is possible, Col. Emmet suggested, that this species is not the rarity it is believed to be, but is most secretive in its habits.

Commenting on the exhibit Mr. UFFEN said he had carefully sifted debris taken from the base of the food-plant and could find no *C. laripennella* at all; yet one moth had just emerged.

Mr. CHALMERS-HUNT said he had kept his *C. clypeiferella* in a bag and in the spring found he had *C. laripennella* cases as well. The cases of the latter species he reported to be quite distinct from any other coleophorid case he knows.

Mr. R. W. J. UFFEN—A living larva of *Pyrausta funebris* Stroem (Lep., Pyralidae) which had just changed to its bright yellow, pre-pupal colour; normally the feeding larva is green.

Mr. S. N. A. JACOBS—Two examples of *Calioptilia hemidactylella* F. (Lep., Lithocolletidae) from the collection of the late William Fassnidge. He referred to Col. Emmet's exhibit at the previous meeting (p. 94) when attention was drawn to reference to the species by S. C. Scarsdale Brown's paper in which it was stated 'the species does not seem to have been taken for many years'. Col. Emmet mentioned that the last record he could find was some 50 years before Brown's paper. The two specimens bred by Fassnidge bear the dates 5 and 6.ix.46 and are marked 'e.l.', showing they had been reared by him. Fassnidge and Brown were close friends and the dates therefore raise something of a problem. He stated that in his opinion the insects had been reared and set aside for identification. It will be remembered that Fassnidge had been accidentally shot and severely injured, and he was not as active as formerly, otherwise he would have consulted Brown, and the specimens would have received attention in Brown's

paper. Mr. Jacobs also exhibited a drawing of a sycamore leaf which Col. Emmet had given him, containing four mining positions of a caloptiliid larva which might well be that of *Caloptilia hemidactyla*.

Mr. P. A. BOSWELL—Living workers and a queen *Leptothorax tuberum* (F.) (Hym., Formicidae) from the Avon Gorge. This species, he said, will tolerate arid conditions.

COMMUNICATIONS

The question of the colour of a larva might be made easier, said Mr. E. S. BRADFORD, if a colour chart could be devised; but Mr. F. D. BUCK said in these critical areas most people's colour vision varies to the extent that charts would be of doubtful value. Mr. R. W. J. UFFEN believed the major problem was describing the colour of a larva within the mine.

A new county record for *Infurcitinea argentimaculella* Staint. (Lep., Tineidae) was given by Mr. E. S. Bradford. He said he had found the species in Hertfordshire in a lichen on stones by the side of a pond. His attention had been attracted by the appearance of the lichen, which seemed to have spider's webs over it and there were also small white patches. He suspected the species, and the lichen, had been introduced with the rocks when the pond had been constructed. He proposed further investigation.

Referring to microlepidoptera going over two years before emerging, Mr. Bradford said he now had two *Coleophora* species which had gone into the second year. He also discussed parasites from *Coleophora*.

Mr. N. TUROK said the Hampstead Natural History Society were contemplating introducing *Vanessa io* L. (Lep., Nymphalidae) on to Hampstead Heath, since the insect appears to be absent. He asked for advice and a discussion followed.

It was suggested by one member that the old part of Highgate cemetery might provide a reserve of wild life for Hampstead Heath. Foxes, for instance, were reported from the area, and this could provide a haven for them.

Commenting on the disappearing lepidopterous fauna of London, Mr. Uffen said that a decade ago he used to find *Lycia hirtaria* Clerck (Geometridae) in the Chiswick area, but had not seen it for the past five years. Another moth to disappear is *Chrysoclysta lineella* Clerck (Cosmopterygidae) which used to occur on the limes. A parasite of this species also noted has gone with the moth. Mr. Uffen's own particular theory was that with the introduction of all-night sodium street lighting the moths have ceased to fly, and thus have failed to breed.

This last-named insect, said Mr. S. N. A. JACOBS, used to be found in Fenchurch Court in the City of London, with the braconid parasite, but he could not say if it was still there.

The species was shown to him, said Col. E. M. EMMET, by Mr. S. Wakely at Crystal Palace. He was in that area a short while ago and could find only empty pupa cases, but he had the impression that the species was still there.

Mr. Bradford said that just after the war he had seen *Phalera bucephala* L. (Notodontidae), *Mamestra brassicae* L. (Noctuidae) and *Menophra abruptaria* Thunb. (Geometridae) in the Holloway area of London, but these do not appear to be occurring there now.

Mr. Jacobs said the habit of *Lycia hirtaria* Clerck to overwinter several years might encourage the hope that the species has not really disappeared.

9th SEPTEMBER 1971

The President, Col. A. M. EMMET, in the Chair

The death was announced of Mr. T. R. Eagles and of Mr. P. Cue.

The following new members were declared elected: Mr. K. W. Mardle and Mr. T. R. Sinclair Price.

EXHIBITS

Col. A. M. EMMET—*Caloptilia rufipennella* Hübn. (Lep., Lithocolletidae), a species new to Britain, bred ex larvae from sycamore from Chippenham Fen, Cambs. (see exhibits 8th July p. 94). For comparison *C. elongella* was also shown. The exhibitor pointed out that *C. rufipennella* could also be confused with *C. betulicola* Her., but since the differences between that species and *C. elongella* were so slight there was no point in exhibiting both. The differences between this new British species and *C. elongella* can be summarised as follows: *C. rufipennella* is smaller, 11–12 mm as against 16–19 mm. The wings, in general, are more chestnut or mahogany than is usual in *elongella*, though this is variable. The underside of the abdomen in *rufipennella* is silvery-white but in *elongella* it is yellowish. The anterior legs of *rufipennella* are clothed with long ornamental scales which are darker than the forewings, while these are the same colour as the forewings in the other species.

C. rufipennella does not appear to be unusually rare in the Chippenham area, in fact the cones are quite common. The species does not appear to be localised because the quite distinct vacated cones have been noted in the Barton Mills area.

Dr. B. J. MACNULTY—(1) *Aradus betulae* L. (Hem., Arabidae) bred from nymphs taken in Glen Affric, Inv., 7.viii.71. Five nymphs in all were found, one of which was lost in the field and three imagines were bred. Since on both this and the previous occasion when the exhibitor found this species woodlice were present, the final nymph was put in with woodlice to see if the bug fed on them. Unfortunately the woodlice ate the bug. Two examples were presented to the Society. (2) A series of *Leptura sanguinolenta* L. (Col., Cerambycidae), one from Abernethy Forest and the rest from Loch Charlich, near Aviemore, Inv.

Mr. A. E. STUBBS—The following Diptera: *Ctenophora bimaculata* L. (Tipulidae), a male taken near Taunton, Somerset, 6.vii.71, where it was swept from a shaded ditch under pollarded willows; *Nephrotoma crocata* L. (Tipulidae), a female taken 2.vi.71 on Thursley Common, Surrey, on the edge of pine woods; *Oxycera pulchella* Meig. (Stratiomyidae), a female swept from a ditch on the marshes at Benfleet, Essex, 1.viii.71; *Stratiomys longicornis* Scop. (Stratiomyidae), males and females swept from a ditch on the marshes at Benfleet, 2.vi.65.

Mr. A. E. GARDNER—(1) A series of *Omophron limbatum* F. (Col., Carabidae) taken at Rye, Sussex, 3.ix.69. This interesting species, first recorded in Britain in 1826, was rediscovered by R. A. Farrow in May 1969 (1970, *Ent. mon. Mag.*, 106: 219). (2) A series of *Quedius auricomus* Kies. (Col., Staphylinidae) taken in moss under a waterfall on the Brecon Beacons, Breconshire, at 2,800 ft on 30.viii.71.

Mr. C. MACKECHNIE JARVIS—The following Coleoptera: *Lebia crux-minor* L., a species known to Marsham (1802) as a British insect. It has been taken in a number of English counties, singly, with the notable exception of Dr. Power's remarkable capture of 26 examples between May and August 1856. The discovery in Ireland is due to Edwin Bullock who took one example near Killarney in 1914. As far as the exhibitor is aware it has not been recorded in Ireland since.

The exhibited specimen was swept at Lough Dearg, Co. Clare, in June 1971.

Adistemia watsoni (Woll.) (Lathridiidae) was first recorded as British in 1912 by G. C. Champion who found it in the British Museum (Nat. Hist.). Prof. H. E. Hinton recorded it in numbers, also from the British Museum, in 1941. No other records have been traced so it would appear that the three exhibited examples are the first to be found in the open in this country. These were taken at intervals during the summer in spent hops and malt, which in small quantities, had been placed in the garden of the exhibitor's Chelsea house, after boiling in beer-making.

Lithostygnus serripennis Broun (Lathridiidae), a beetle known from a number of captures in this country, mainly in houses, since its discovery here by C. E. Stott at Reigate in 1928. It was first described from New Zealand. The three examples exhibited were taken singly over the space of two years, crawling near skirtings in an old house in London, N.W.1.

R. W. J. UFFEN—a female *Tenthredo omissa* (Forst.) (Hym., Tenthredinidae) from Sawbridgeworth Marsh, Herts, 30.viii.71, a new county record. Also *T. marginella* F. from Juniper Valley, Box Hill, Surrey, 8.viii.71, for comparison. *T. omissa* is of darker appearance than *T. marginella* because of the duller and smaller yellow markings. The rusty-brown hind tarsi of *T. omissa* are concolorous with the tip of the tibiae, whilst the tarsi of *T. marginella* are black.

COMMUNICATIONS

Referring to the previous meeting Mr. S. R. BOWDEN asked if the *Pieris napi* L. exhibited was not in fact form *flava* Kane and not ab *hibernica* Schmidt (properly *sulphurea* Schöyen). From the descriptions he gave it was agreed it was indeed f. *flava*.

Commenting on Lepidoptera Mr. R. F. BRETHERTON said that in a wood near Plaistow, Sussex, on 27.viii.71 he had caught a second brood example of *Clossiana selene* Schiff. (Nymphalidae). It was a very small female, only 40 mm approximately, with the ground colour a darker brown, and the black markings more extended, than is normal in the first brood.

At Wisley, in the Royal Botanical Society's gardens, on 4.ix.71, the buddleia was, he continued, smothered with *Aglaia urticae* L. (Nymphalidae); also *Vanessa atalanta* L. and *Nymphalis io* L. (Nymphalidae) and *Celastrina argiolus* L. (Lycaenidae) were present. Of particular interest, however, was an example of *Lamides boeticus* L. (Lycaenidae) settled on a flower in the Long Border. Judging from the weather charts for the period Mr. Bretherton thought the insect may have come from the direction of Spain. It is one of the rarest of our immigrant butterflies, with less than a hundred records in all.

On returning home to Bramley, Mr. Bretherton also said, he saw a battered female *Thecla betulae* L. (Lycaenidae) on his buddleia. Though the larva of this species is locally common in the South and Midlands, the imago has retiring habits, and he had never before seen an imago in the district, or elsewhere.

Mr. J. L. MESSENGER reported taking *Rhodometra sacraria* L. (Lep., Geometridae) at Witney, Oxfordshire, on 3.ix.71 and had heard of several more being seen in Devon. It therefore looked as though there had been a minor migration.

This year, said Mr. G. PRIOR, he had seen no *Colostygia pectinataria* Knoch (Lep., Geometridae) in June, but had noted examples of the second brood at Ruislip, Middx. recently.

Referring to his remarks at the previous meeting (see p. 97), Mr E. S. BRADFORD said he went back to the locality in Herts. a few days later and found several *Infurcitinea argentimaculella* Staint. (Lep., Tineidae) on the lichen. He

added that he had now discovered unmistakable signs of the moth in Surrey at St. Marthas, though as yet he had seen no actual specimens to confirm their presence.

With reference to *Lampides boeticus* L., Mr. S. N. S. JACOBS said Mrs. Muspratt had commented that, after the war, the larvae formed a large part of their diet, being in imported French peas.

DISCUSSION ON NOMENCLATURE

The discussion was opened with some general remarks by the PRESIDENT.

Mr. R. W. J. UFFEN said a distinction must be made between nomenclature and classification. A considerable part of the nomenclature problems arise out of the difficulty of defining what constitutes a genus; that which one person regards as a single genus another may regard as several, or even part of another; and therefore the parameters of the genus could well vary according to the person working within the family concerned.

Mr. F. D. BUCK defended the International Rules of Zoological Nomenclature saying that while various people, including himself, found fault with certain aspects of the rules, they were after all the rules. If one ignored them or acted contrary to them the logical result could only be complete anarchy. Many problems in the past were a direct result of non-compliance with the rules. Redress regarding both the rules themselves and problems of individual taxa arising out of the correct application of an otherwise good rule, lay in the hands of individual workers. In the first case complaints and suggestions can be lodged with the International Commission for their consideration at the next meeting; and in the second case application can be made to the Commission for a name to be placed on the Official List if a reasonable case can be made.

Mr. R. F. BRETHERTON also drew attention to the availability of *nomina conservanda* which he combined with a condemnation of those taxonomists who deliberately searched for evidence to upset existing names, particularly those of long standing. He also objected strongly to those books published with an index compiled on a generic basis, an objection which met with much agreement from the meeting. Another matter which troubled Mr. Bretherton was that there was no provision within the rules for infra-subspecific nomenclature. Therefore, some authors used subspecific names very sparingly, while others gave subspecific status to minor geographical races, which, though they needed to be identified, did not deserve that status. Mr. Buck could see no reason why the rules as they now stand could not be applied direct to this level of nomenclature, the problem was no different to that at either specific or generic level, and he could not understand why workers did not apply them in this way.

In Mr. S. R. BOWDEN's opinion the rules are not difficult to understand and, Mr. Bowden added, the species is often just as difficult to define as the genus. He cited cases in support. However he did suggest that when the rules lead to nonsense they should be disregarded.

Mr. S. N. S. JACOBS believed we should leave the rules to the professionals, and in the interests of order, work to those that are devised.

It was suggested by one member that the problem of defining the genus or species could eventually be resolved by an analysis of the DNA. This did not find a great deal of support and Dr. B. J. MACNULTY pointed out that though two DNAs may be alike chemically they could in fact be different, and operate considerably differently because one, or more, amino acid goes into the molecule differently. To think in terms of DNA was, he believed, a mistake; though in time he thought chemistry might be of some help. A question whether DNA

could, or could not, be extracted from a dried specimen produced a negative answer.

Dr. J. D. BRADLEY gave an account of the workings of the International Commission on Zoological Nomenclature. There were, he said, not less than 18 commissioners, selected internationally, most being elected at five-year intervals when the Commission meets. There is also a small permanent secretariat whose office is at the British Museum (Nat. Hist.). From time to time they publish 'Opinions' in the *Bulletin of Zoological Nomenclature*. The 'Opinions' are mostly in legal jargon, and it is not unknown for the Commission to reach a wrong conclusion. A rule may be changed at a Commission meeting providing a good case can be made and approved at a Zoological Congress. The rule of limitation (Article 23 (b)), for example, was found to be impractical and was abrogated, so we are now back to the strict application of the rule of priority (Article 23 excluding (b)), pending a possible re-introduction of a limitation rule in a more workable form.

Dr. Bradley went on to say there were difficulties in the application of the priority rule, and explained that where the type was lost and where the type, or type series, referred to a different species to that hitherto generally known for that taxon, complications arose.

On these last points however, Mr. Buck said the remedy was clearly in the hands of the researcher, and persistent difficulties arose in the majority of cases because the researcher did not take the necessary steps to resolve the problem and place the taxon on a firm basis. These steps were, in the case of the lost type, the selection of a neotype; and in the case of the type, or type series, being different from the insect generally known by the name in question, an application to have that name by which the insect is currently known placed on the Official List. He also thought eventual stability would be obtained through the priority rule and the careful use of the Official List; and that much quicker than the *laissez faire* method so often practised though less often openly advocated.

It was further stressed by Dr. Bradley that genuine transfers of species from genus to genus cannot be avoided, and not only does the problem of the gender of the trivial name arise, but synonymy and homonymy often complicate the issue.

A suggestion was made that the rule requiring trivial name to agree in gender with the generic name arose because originally most taxonomists had a classical background, and that since original descriptions were then composed in Latin the grammatical accuracy of the generic/trivial combination was then natural. It now appears to be an anachronism.

Benfleet and Hadleigh marshes in danger: a report from the Society's representative on the Joint Committee for the Conservation of British Insects. All entomologists familiar with the Essex marshes will know the salt and freshwater marshes and adjacent scrubby slopes between South Benfleet station and Hadleigh; it is one of the regular field excursion localities of this Society. A Country Park is now planned for the area. Whether this is a threat or an advantage remains to be

seen, but the entomological interest is certainly in danger until our needs are taken into account.

I first became aware of a threat in 1967 when a local farmer informed me he hoped the area would be made into a golf course within a few years. However, the first direct threat emerged at the first meeting of the Joint Committee in November 1968 when we were told of an imminent public inquiry concerning proposals to tip rubbish over Hadleigh marsh. The locality is scheduled as a Site of Special Scientific Interest and the Nature Conservancy requested entomological information to incorporate into its evidence for the enquiry. We later heard that the proposal had been rejected by the Minister. The Country Park concept has been in the air for well over a year, but at the seventh meeting of the Joint Committee, in January 1971, we were informed that the project was likely to be implemented within the next two to three years.

Having been concerned with gathering information at the time of the tipping proposal, I have agreed to act as co-ordinator for the Committee in assembling entomological information.

The Country Park scheme is essentially orientated towards amenity. The County Council wishes to carry out a number of 'improvements' which will give greater access and enjoyment for the public. Full plans are not yet available, but the type of improvements we have to consider are access roads and paths, car parks, toilets, snack bars, picnic sites, play areas, boating lakes and a golf course. Inevitably much of the area is liable to extreme modification.

The Country Park will, however, include an area set aside for natural history purposes—possibly a reserve. Essex Naturalists' Trust have been considering botanical/ornithological areas, but one cannot expect that all entomological interests will be automatically coincident. There are clearly a number of widely dispersed areas of entomological value and the future of the ponds and ditches is particularly worrying. It seems likely that a single block of ground will suffice, but we need to ensure that special measures are included in the plans to safeguard outlying areas. A golf course for instance could be designed so as to leave critical spots as rough ground—though the question of personal safety is another matter.

The future is not necessarily bleak, since concessions are open and there may be opportunities of reserve management which would not otherwise be available. However, entomological information is urgently required—the location and habitat requirements of scarce species, the location of areas with species for the main habitat types, recommendations for management of the selected areas (applying particularly to scrub grassland), and any other matters which seem relevant. The greater the weight of information, the more likely we are to be seriously heard. If you can help, please remember that generalised information is of little use; close demarcation on the ground is the objective, so sketch maps are very useful.

This opportunity marks a new era for the Society, when the entire membership is given the chance of defining their conservation interests in a site, with the prospect of a reserve and management. Entomologists have all too often not been consulted on a conservation issue of this sort in the past. One hopes that those who know the Benfleet and Hadleigh marshes will help to ensure that future generations of entomologists have no criticism over the loss of a first-rate locality.—ALAN E. STUBBS, 91 Clitherow Avenue, Hanwell, London, W.7., 28th January 1971.

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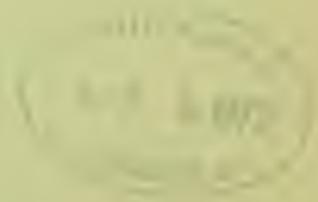
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4



From the original watercolour drawing by A. D. A. Russwurm.

Aberrations of *Callimorpha jacobaeae* L.

- | | |
|------------------------------------|---|
| 1. ab. <i>transparens</i> Watson ♂ | 3. ab. <i>inversa</i> Watson ♀ |
| 2. ab. <i>albescens</i> Cockayne ♂ | 4. <i>sinis</i> . ab. <i>coneyi</i> Watson dex. typical ♂ |

(Shown at the Annual Exhibition, 7th November 1970 by Mr. R. W. Watson)



**'PIERIS NAPI' (LEP., PIERIDAE) IN AMERICA:
GENETIC IMBALANCE IN HYBRIDS**

By S. R. BOWDEN

As has been shown more than once (e.g. Ford 1964, Bowden 1970b), the species problem in the *Pieris napi* L. group of butterflies is to some extent an unreal one: no artifice with semi-species and the like will produce a biological species-concept wholly appropriate to the group, because every grade of separation exists, between barely distinguishable demes with tenuous geographic boundaries at one extreme and fully distinct sympatric species at the other. Nor can we apply to allopatric populations even the test of frequency of fertile inter-pairing in natural conditions. But real or unreal, the problem can still bedevil nomenclature.

Huxley (1942) noted that though some reduction of fertility between two divergent stocks might be due directly to the accidents of divergence, it would subsequently be carried further by selection; the zone of intergradation (in certain bird groups) was found to be narrowest where the two forms were presumed to have been longest in contact, and where therefore selection to reduce biological waste had had most opportunity to be effective. Bowden (1956) thought that Swiss *Pieris bryoniae* Ochsenheimer hybridised less successfully with the adjacent *P. napi* than with that of England, with which it had had no previous contact.

Remington (1968), considering many cases of butterfly hybridisation but not including *Pieris*, elaborated and illustrated the view that related populations in secondary contact tend to hybridise unless they are already very distinct indeed, but where differences are moderate a sexual barrier is gradually built up, so that only where previous separation has been relatively short can the populations merge.

This would provide a basis for a criterion of specific status where the taxa in question have come into contact. If sympatry is leading to increased genetic and sexual barriers between them, the populations are to be taken as already belonging to distinct species; if not, not. This test is formally more precise than some previously suggested: but its value is mainly theoretical. It too is not directly applicable to geographically separated subspecies, which present the most difficult questions, and it might require extensive experiment or observation over a long period, in any individual case. Its use to the taxonomist in the short term is thus very limited. It is to be noted that it fixes speciation at a rather earlier stage than the 'full speciation' of some systematists (which cannot be defined exactly), but does not depart essentially from Jordan's dictum (1896), that a 'variety' becomes a species at the point when it is no longer possible for the diverging form to coalesce with the parent stock.

Differences capable of leading ultimately to 'full speciation' are of more than one kind, but the most fundamental are those that render hybrids inviable or infertile. Hybridisation in captivity allows us to assess such differences. Individual butterflies vary so much, however, that a negative result should not be regarded as final except after repeated trials, and these are not always possible; on the other hand positive results cannot altogether be explained away even if they are exceptional. Even among viable and fertile hybrids, the slight protandry normal in adult emergences may suffer gross disturbance; this not only indicates genetic imbalance but may also in nature reduce Darwinian fitness (Bowden 1953). With diapause disturbances unisexual lethality is sometimes associated.

Thus in spite of their known limitations, experiments such as those now reported, as well as suggesting relationships, also provide means of estimating the

relative likelihood of a positive isolation gradient if the populations were to meet. However, no absolute measure of the probability can thus be obtained.

Some tentative conclusions will be drawn regarding the three Nearctic taxa treated here, but still on the conservative principle that when there is any doubt a subspecies is to be retained in *napi* rather than split off as a separate species. A re-assessment should be made after a wider study including at least ssp. *venosa* Scudder of California, *hulda* Edwards of Alaska and one of the southern high-altitude populations (such as *macdunnoughii* Remington of Colorado), and taking into consideration larval characters, pupal shape, imaginal proportions, melanic markings of adult, androconial scales and (if possible) distribution of apparent natural hybrids.

It may be thought surprising that no account is given here of the pairing behaviour of the parents of hybrid broods. For various reasons I did not think I could provide usable information:

- (1) Only rarely at this time was it possible to watch the butterflies continuously, and a large proportion of the pairings which must have taken place were not seen at all.
- (2) Pairings may occur in much less than one hour, but even within a pure subspecies may be delayed for three days or more. A female may strongly reject a conspecific male, but later accept him. Individual differences in libido are probably mainly responsible.
- (3) Libido is affected by age, state of nutrition, temperature and illumination, none of which could be wholly controlled in the circumstances prevailing.
- (4) It is difficult to obtain any reliable measure of the preference of a butterfly among possible mates, even in *ad hoc* experiments (cf. Petersen and Tenow 1954). Tests in which no choice is permitted are in one sense inescapably unrealistic.

In spite of these difficulties, adequate information on the behaviour of males in the presence of females of a different subspecies could be very helpful. For example, a succession of similar males might show no interest, but when removed to another cage pair immediately with females from a more closely related population. The majority of cases will of course be more equivocal: cautious interpretation is always necessary. It is hoped that Dr. Lorković's observations on American and American-European pairing will soon be available.

SOURCES OF PURE STOCKS

Material of Connecticut *P. virginensis* Edwards and of New Hampshire *P. napi oleracea* Harris was provided initially by Mr. S. A. Hessel; Oregon *P. napi marginalis* Scudder came from Mr. C. W. Nelson. Without their great help this work would have been impossible. The rearing of the pure subspecies has been described and discussed elsewhere (1971b).

Swiss *P. bryoniae bryoniae* and Carinthian *P. b. neobyroniae* Sheljuzhko were originally obtained for me by Dr. F. Benz and by Herr H. Deschka, to whom once more I offer my thanks.

HYBRIDS, *P. VIRGINIENSIS* × *P. NAPI*

In both 1963 and 1964 female *virginensis* were paired with British *napi*, in the course of experiments on the genetic control of underside pigmentation (Bowden 1966).

In 1963 Head's bright yellow *napi* (f. *sulphurea* Schöyen) was used in the F_1 (1963-*f* and -*g*), as well as in the subsequent back-crosses (1963-*j*; 1963-*i* and -*y*). In

1964 Scottish (Angus) wild-stock *napi* was used for the F₁ (1964-*m*) and Head's form subsequently (1964-*j*; 1964-*ii* and -*iii*).

In all these broods the larvae continued to accept *Alliaria* and could, without disadvantage, be reared to maturity on this plant; this was so even for larvae of 1963-*f*, which had been on *Dentaria* for a time (the refusal of *Alliaria* by American subspecies has been discussed earlier: 1971a). In all the F₁ hybrids larval losses were extremely low.

VN BROOD 1963-*f*

This was from female 1962-*V5* paired with males from 1962-1.

Thirty-two males emerged without diapause, followed after a few days by three females. Fourteen malformed pupae as well as nine pre-pupae died, and three pupae which appeared to be overwintering were dead by mid-November; of these last (all slightly misshapen) two were female and one undeterminable.

VN BROOD 1963-*g*

The eggs were laid by female 1962-*V6*, caged with males from 1962-*ii*.

Twenty-four males emerged 27.vi to 3.vii.63, followed by seven females 3.vii to 8.vii.63. Of three faulty pupae examined, two were definitely female, the third uncertain. Five other pupae died, none quite normal, and four prepupae collapsed and blackened. By 13.vii nine pupae were apparently lying over. However, on 20.x.63 four females were found emerged and crippled, with two more caught in their pupal skins by imperfect discoloured wings. Three pupae were dead then or shortly thereafter (two which were sexed were both females).

VN BROOD 1964-*m*

Female 1963-*V20* was caged with four white Angus males, and there was at least one pairing. Twelve eggs were laid before the female was dead, possibly drowned in a heavy thunderstorm. One laggard larva died. Four males emerged 16-17.vii.64, followed by six females 18-23.vii.64.

FEMALE DELAYED ECLOSION AND INVIAIBILITY IN VN

Though the male hybrids were considerably larger than typical *virginiana*, and even rather larger than the *napi* used, the development of the females was much disturbed. In all three broods the separation of male and female emergences was complete, and in 1963-*g* some females were delayed for months, though apparently not in full diapause. In 1963-*f* only two good females were obtained, against 32 males. On the other hand brood 1964-*m*, though again completely proterandrous, showed no sign of female inviability; the *napi* stock was of course different, but this kind of discrepancy may be expected to result not uncommonly from concealed individual differences in the parents. Breeding to test viability and fertility is best repeated several times.

SUMMARY OF VN

	1963- <i>f</i>	1963- <i>g</i>	1964- <i>m</i>
Males eclosed	32	24	4
Others	29	28	6
made up as follows			
Females, good or fair	2	7	6
Females, crippled or caught in pupa	1	6	—
Deaths as pre-pupa	9	4	—
Deaths as malformed pupa	17	11	—

VN PHENOTYPES

These F_1 insects, which ran up to 58 mm in size, followed *napi* on the upperside; on the underside the quasi-*subtalba* of *virginensis* prevailed. The males did not always develop a discal spot; male f18 was quite without this, and correspondingly the underside of the forewing was unspotted. The perfect or nearly perfect females included three with upperside hindwing vein-ends strongly marked with grey-black and at least seven others more lightly marked. The normal underside pattern of *virginensis* is rather less defined than that of *napi*: however there is, in both, considerable mixing of dark and pale scales along and across the veins. The hybrids were perhaps intermediate; the underside 'veining' always tends to be reduced in non-diapause *napi* butterflies of whatever origin, and these hybrids were no exception. The background colour was without the lemon-yellow pigment; the females were ochreous below, as expected, but (surprisingly) many of the males also were tinted with ochre on the underside of the hindwings—an appearance quite unknown in European males of f. *subtalba*. The intensity of the male ochreous pigmentation, though occasionally strong, never equalled that of Kautz's female type of *subtochracea* (Müller and Kautz, 1939: Plate 13, fig. 10). In both sexes there was a normal orange lunule at the base of the hindwing costa.

(VN)²

No F_2 eggs could be obtained when two females of 1963-g were caged with three males of 1963-f, though at least one pairing was seen and the females lived for about three weeks. It seems unlikely that F_2 hybrids can exist.

N.VN BROOD 1963-j

Three males of 1963-f were caged with a British female of Head's form. She laid 26 eggs and died within ten days. Thirteen of the eggs were infertile (or died) and there were losses also in the larval, prepupal and pupal stages. Three males emerged, all white and *subtalba*.

N.VN BROOD 1964-j

Males m1 and m2 were caged in mid-July with three British *sulphurea* females which, however, within nine days had all met with accidents. There were nevertheless probably two pairings and over 100 eggs were obtained. Losses in the early stages were very few, and between 25 and 31.viii.64 23 males emerged, followed by four males and five females between 1 and 13.ix.64. Fifteen of the 32 butterflies were *subtalba*, the rest were not.

During the spring and summer of 1965 the 61 over-wintering pupae were brought out of 1°C at intervals, the first batch of 29 as early as 20.ii.65. Of these, eight males and one female emerged by 7.iv, followed by two females on 11 and 13.iv.65; shortly after this 14 remaining pupae were returned to 1°C till 21.v.65. Two females emerged on 11 and 13.vi.65 and the other 12 pupae were returned to 1°C from 27.vii to 1.xi.65. One pupa now coloured (as white, non-*subtalba* male), but the butterfly did not emerge. Six remaining pupae were kept at 1°C from 15.iii to 3.xi.66, when two were still alive, but all were dead by 28.xii.66.

Thirteen+19 other pupae were withdrawn on 8.vi and 16.vi.65. Eclosions were 11 male+five female, without proterandry, and the subsequent history of the remaining pupae was similar to that of the batch of 29, detailed above.

VN.N

This reciprocal back-cross was not obtained: a female from 1964-*m* was not seen to pair with the *napi* males provided and produced no eggs.

N.VN PHENOTYPES

These have been listed, counted and discussed in respect of the *subtalba* and wild-type morphs in Bowden, 1966. Markings followed the European *napi* pattern. The ochreous tinge on the underside of the *subtalba* males, when noticeable, was very faint.

Male 1963-*j2* had on the upper side of a forewing five narrow streaks of bright *sulphurea*. Somatic mosaicism of this kind is thought to be due to faulty mitosis, particularly probable in wide hybrids, leading to local losses of the whole or part of one chromosome—in this case that carrying the dominant *subtalba* gene S, so that s^h in the homologous chromosome is expressed.

N.(N.VN) BROODS AND PHENOTYPES

The double back-cross was essential in the investigation of '*subtalba*' in *virginiensis*. For an account of the broods 1963-*y*, 1963-*i*, 1964-*iⁱ*, 1964-*iⁱⁱ* and a description of the resulting phenotypes (all *subtalba* or *sulphurea*, with no wild-type), see Bowden 1966. Apart from 1963-*y* all were numerous broods and both sexes emerged well both before and after diapause. There was nevertheless a strong tendency in 1963-*i* for males to emerge before diapause, and a slight total deficiency of females: the numbers were:

before diapause	125 males + 42 females
after diapause	9 males + 51 females

In brood 1963-*i*, two *subtalba* butterflies male *i76* and female *i211* showed respectively a multiple streak of *sulphurea* colour on the right forewing upperside, and about eight small adjacent patches of bright yellow under the right hindwing. In 1964-*iⁱⁱ*, male *iⁱⁱ29* carried a yellow streak on the right forewing upperside.

The 1966 paper recorded and discussed not only the ochreous colour found in *virginiensis* and hybrid males, but also the occurrence of a very pale clear yellow on the hindwing undersides of *subtalba* males and females of 1963-*i*. We have as yet nothing to add to the account then given.

HYBRIDS, *P. VIRGINIENSIS* × *BRYONIAE*

P. virginiana resembles *P. bryoniae* in several respects: particularly its tendency to univoltinism and its high chromosome number ($n=26$), possibly also its possession of the morph *subtalba*. It seemed likely that hybridisation would be easier than with *napi*. The possibility has still not been adequately explored, but two experiments have not been encouraging.

VK BROOD 1963-*h*

The two males used with female 1962-*V12* were non-*subtalba* individuals of ssp. *neobryoniae* of Kärnten stock. Two days after caging fertile eggs appeared, but after nine days the female was dead and there were only six eggs. Probably one larva ate another. Four males and one female emerged without diapause.

All were quasi-*subtalba* and the white males were more or less ochreous on the underside of the hindwings, with only a few black scales bordering the main veins. The males all had discal spots, even when (as in one case) the apical patch was reduced very much as in typical *virginiensis* and some *bryoniae*. The female was

flava above, with *napi* marking nearly normal but without napi- or bryo-streak; the rather strongly ochreous underside showed very little vein marking.

VB BROOD 1967-z

Nine Swiss *bryoniae* males were placed in a hanging cage with *virginiensis* females 1966-vⁱ1 (marked) and 1966-z^v9, 10, 16, as well as two *bryoniae* females of a different brood (these were removed as soon as they were paired). There was at least one *virginiensis* pairing (after three days); the females were never separated as intended, as all were dead after five days.

After discarding some infertile eggs, we obtained five larvae with slight yellow rings round the spiracles. One bled as a pre-pupa and died.

Three females emerged without diapause; these had pale *bryoniae*-like uppersides, and weak marking on ochreous and pale ochreous *subtalba* undersides. An over-wintering pupa was sent to Dr. Lorković.

HYBRIDS, *P. VIRGINIENSIS* × *P. NAPI OLERACEA*

This cross was attempted in both directions. There was no difficulty in obtaining pairings, but these by no means ensured fertility in eggs.

OV FAILURES

In July 1965 two females of 1965-O were caged with three males of 1964-V. There was at least one pairing, and eggs were numerous, but all infertile.

In May 1966, female 1965-o^{vii}11 was caged with three *virginiensis* males, 1965-u^v1, 2, 3. No pairing was seen, and about 12 eggs were all infertile.

VO BROOD 1965-qⁱ

In mid-July two females of 1964-V were caged with three males of 1965-O. One pairing was seen, and soon eggs appeared on *Alliaria* and *Hesperis*; towards the end *Nasturtium* was used. There were considerable losses in the early hatches, especially on *Alliaria*, before the larvae were transferred to *Nasturtium*; thereafter losses were very few. Sixty-three butterflies emerged without diapause, but of these 12 were crippled and others thin-scaled and very weak.

Three over-wintering pupae (including one green) were sent to Dr. Lorković in March 1966.

VO BROOD 1965-qⁱⁱ

The brood was obtained in the same way as *qⁱ*. All 49 butterflies emerged without diapause.

VO BROOD 1966-d

Two females of 1965-u were caged with males 1965-o^v2, 3, 4 in July. About 25 eggs produced 17 larvae. Immediate eclosions were five females from green pupae, and 11 buff pupae lay over the winter. These were involved in a refrigeration failure in the following July, but males emerged from all.

VO BROOD 1966-f

Female 1965-v^v9 was caged with male 1965-o^{vii}10 on 1.v.66. No pairing was observed on this very favourable day, so male o^{vii}12 was added. Eggs brought in up to 13.v.66 were all infertile, but of subsequent eggs to 16.v only seven were infertile, and 29 larvae were transferred from *Alliaria* (some of which they had eaten) to watercress. There were a few losses in the early stages but 19 butter-

flies emerged, of which three were crumpled or otherwise crippled. The three best females and three best males were chosen to attempt the F₂ (see below).

(VO)² FAILURES

These six insects were caged together on 2.vii.66 and a pairing obtained by 2 p.m. the same day, but the males died after two, two and six days and no eggs were laid before the last two females died about the middle of the month.

VO PHENOTYPES

The uppersides were near the milk-white shade characteristic of *virginiensis*, with minimal markings (except for a few of the females). The undersides were always quasi-*subtalba*, often slightly ochreous in both males and females. On the other hand the underside vein marking was narrow, as in *oleracea*, though it was not sharply defined and extended over the veins themselves. Many 'summer' specimens had little or no vein marking.

Generally, and even apart from the weaklings in 1965-*qⁱ* and *qⁱⁱ*, the butterflies looked as flimsy as *virginiensis*, though often larger.

IDENTIFICATION OF NATURAL HYBRIDS

Hovanitz (1963) discussed the specific separation of *virginiensis* and *napi oleracea*. He chose to regard *virginiensis* as subspecifically rather than specifically distinct, partly at least on the ground of the existence of intermediate populations—

'In New York state and other points in the vicinity, or close to the southern limits of *oleracea*, there are populations which in some cases appear to be more closely related to *virginiensis* than to *oleracea*, and in other cases are more closely related to *oleracea* with occasional individuals similar to *virginiensis*. . . . Populations are rather clearly either *oleracea* or *virginiensis* as the case may be, with only occasional examples of intermediates giving some hint of the nature of introgression at the line of contact.'

Hovanitz does not specify the criteria by which the supposed hybrids are to be recognised, but it is possible that he attaches too much weight to the appearance of a faint so-called 'rapae-type' upperside pattern in the female. This character is quite untrustworthy, being found (though unequally) in probably all American subspecies.

As we have shown, *virginiensis* and *oleracea* carry each a dominant character not shared by the other. This is true at least wherever f. *subtalba* is absent from *oleracea*. In consequence, all spring-brood F₁ hybrids should have white or faintly ochreous (not light greenish yellow) hindwing undersides with narrow vein marking. Straight F₂ hybrids probably never occur, but half the back-crosses (in either direction) should be recognisable by their possession of this atypical combination of characters. It follows that if significant introgression into any local population is taking place, the fact can be established with fair certainty by sampling the fresh butterflies in spring. The summer emergence of both species has much-reduced underside vein marking, so that in this generation *oleracea* × *virginiensis* cannot easily be distinguished from *virginiensis*. In general appearance, including departure from perfect white, the F₁ hybrids resemble *virginiensis*, but these characters are too vague to contribute much to diagnosis.

HYBRIDS, *P. NAPI OLERACEA* × *NAPI* (British)

Ssp. *oleracea* was crossed with British *napi* of form *sulphurea*, though in one direction only, and subsequently direct F₂ and F₃ broods were obtained.

NO BROOD 1964-n

Three yellow females of 1963-p were caged with male 1963-O1; males O2 and O4 were added six days later. No pairings were seen, but eggs began to appear after another three days and ultimately amounted to 30 or more. A few failed to hatch, but 25 pupae were obtained. Twelve males emerged 30.vi. to 5.vii.64 and the remaining 13 pupae were cold-stored from October.

The following spring three males emerged on 22.v and 23.v, followed by eight females from 27 to 31.v.65 and a final male on 31.v. The last pupa remained undeveloped; periods of three months at 1°C, one month at 27°C and eight months at 1°C failed to initiate development and the pupa died when brought again to room temperature.

Brood 1964-n thus followed the proterandrous pattern already seen in *virginiensis-napi* hybrids.

ON FAILURES

A female 1963-O3 was caged 16.v.64 with three yellow males of 1963-p, but this female died early without laying.

At the same time female O5 was caged with two such males, but she died in two days.

The failure to obtain the ON cross was possibly fortuitous. No further attempts were made.

NO PHENOTYPES

Both males and females had *napi*-like uppersides. The hindwing undersides were bright yellow, as in British *napi*. The summer-brood males had narrow vein markings, with the line of the vein itself invaded by dark scales.

The spring-emergence male n13 had a very heavy brown-black, rather broad and pervasive veining; on the upperside marking resembled that of *napi*, with a discal black spot, though the apical patch was rather reduced. The females had a less intense black veining, still invading the vein-line.

(NO)² BROOD 1965-m

Late in May two males and two females of 1964-n were caged together. Though the males died early, one female lived for a month and the other nearly as long. Well over 200 eggs were laid, and about 100 pupae were ultimately obtained, most of which produced butterflies. But many eggs were infertile and there were considerable larval losses, apparently from varied causes.

Emergences the same summer were 20 females plus eight males: a reversal of the proterandrous tendency of the F₁ hybrids. In the spring the sexes emerged together and the sex-ratio was restored.

(NO)² PHENOTYPES

The most frequent marking combination was that found in NO—a *napi* upperside with an *oleracea*-like hindwing underside, the spring emergence generally showing very intense black underside veining.

Of 40 males and 42 females, 16 males and ten females were bright yellow above (the excess of yellow males does not reach significance). About two-thirds of the 'white' females were not pure white, being slightly ochreous or even showing a resemblance to the 'pale yellow' of Thompson (see Bowden 1970a). It was not possible to score these at all precisely. They did not occur among the NO females and at present they are not easily explained.

Napi-like uppersides were 52, to *oleracea*-like 25; undersides were *napi*-like 23,

oleracea-like 52. It was not possible to examine all, but 73 butterflies showed the following combinations:

<i>napi/napi</i>	22
<i>napi/oleracea</i>	26
<i>oleracea/oleracea</i>	24
<i>oleracea/napi</i>	1

This last specimen indeed appeared intermediate in character both above and below. Many others were difficult to allot, particularly in respect of hindwing underside marking, and part may have been in some measure intermediate. The underside of the forewing always followed the facies of the upperside.

The '*oleracea*' phenotype could be supposed due to a recessive gene controlling the nearly unmarked upperside, plus a dominant gene controlling the sharply marked underside veining. If these segregated independently, the above classes should have numbered 14, 41, 14, 4 specimens. If however a single gene was recessive in respect of one character and dominant for the other, or if two responsible genes were closely linked, we should expect the classes to number 18, 36, 18, 0. On either expectation, the second class ('*napi*' above, '*oleracea*' below) is under-represented in our sample, suggesting that individuals carrying mixed determinants for wing marking are at a disadvantage. However, if we eliminate the *oleracea/napi* class from consideration and neglect the doubtful insect placed in it, $\chi^2 = 4.67$ with 2 degrees of freedom and P is slightly less than 0.1, so that statistical significance is marginal.

The genetic and environmental control of the *oleracea* characters, reduced upperside marking and sharply defined underside veining, is being studied further in complex back-crosses of an *oleracea* \times *napi* F₁ to *napi*; this work will be reported later.

(NO)³ BROOD 1966-*pⁱ*

The *sulphurea* female 1965-*m53*, *napi*-like above but with 'sharp' underside marking, was caged with three white *oleracea*-like males of the same brood, which were rather small but vigorous. There was a pairing next day (21.viii.66) and moderate numbers of eggs were brought in over three weeks. However, about 80 of these were infertile or died. About 20 larvae died, mostly while still rather small but including one pre-pupa.

In October two males emerged. Two pupae blacked off during the winter and a third male emerged the following summer.

(NO)³ BROOD 1966-*pⁱⁱ*

The caging of *sulphurea* female *m67*, *oleracea*-like above and below, with the white *napi*-like male *m52* was rather more successful. The female lived three weeks and laid many eggs. However, over 120 of these were infertile or died, and there were about 25 deaths spread over the larval, pre-pupal and pupal stages, so that only about 30 adults were obtained.

Of these, six females emerged that autumn; after diapause there was no tendency for the nine females to precede the 15 males or *vice versa*.

(NO)³ PHENOTYPES

The *pⁱ* males were all white above, *pⁱ1* and 2 being marked like *napi*, *pⁱ3* like *oleracea*. In 1966-*pⁱⁱ* there were ten white and five yellow males and five white and nine yellow females; the ratio 15 white to 14 yellow is consistent with heterozygosity of male *m52*. The undersides, in both *pⁱ* and *pⁱⁱ*, carried veining nearly

*

always narrow and rather sharp, but dark scaling usually extended over the vein itself.

HYBRIDS, *P. NAPI OLERACEA* \times *P. BRYONIAE* (Swiss)

This cross was made in one direction only; the reciprocal was not attempted.

BO BROOD 1965-*n*

On 4.ix.65 a supposed female 1965-*oii*1 was caged with three *bryoniae* males of Engelbergertal stock. On 7.ix a re-examination showed the *oleracea* butterfly to be a male; the *bryoniae* males were therefore removed and three *bryoniae* females substituted, two of which lived till 16 and 21.x.65 respectively. Large numbers of eggs were laid, of which about 60 failed to hatch, for the most part by infertility. Larval and pupal losses were very few.

Five females and three males emerged in early November, without proterandry, and 225 pupae lay over the winter at 1°C. Twelve were sent on 10.iii.66 to Dr. Lorković for chromosomal examination, and 18 to Dr. Benz on 24.x.66. The remaining pupae were brought out in batches from April to November and produced 191 specimens, the majority very fine, with normal proterandry. Three males and three females were sent to Mr. B. C. S. Warren, who examined the androconia of the males (Warren 1967).

Another BO association, using three small 1964-*o* males with two *bryoniae* females, produced only a few infertile eggs.

BO PHENOTYPES

As often happens with F₁ hybrids, brood 1965-*n* was very uniform in appearance, showing the most prominent dominant characters of the two parent species. In the males, the apical patch was always dissected into mere lines of black scales following the veins, and the discal spot was usually small. The females carried the full *bryoniae* marking appropriate to the generation, though the forewings were not so completely obscured as in our Engelbergertal *bryoniae* and the scaling was greyer (less brown). The few 'summer' females were slightly more ochreous above than those that had over-wintered; the latter were of quite a pale ochre.

The underside veining was of the sharply defined *oleracea* pattern. In the over-wintered insects the central lines, immediately over the neuration, were generally conspicuously pale as in *oleracea*; the 'summer' females were narrowly veined, without the pale central lines.

(BO)² BROOD 1966-*ji*

On the evening of 25.vi.66, three females and three males of 1965-*n* were caged together. By 10 a.m. next morning there were two pairings (the unpaired female and one male were removed elsewhere, where they paired and produced about 100 eggs which were infertile or died). Over 100 eggs were laid in eight days, after which the surviving female was killed. Most of the eggs proved infertile and only three larvae hatched, of which one failed to grow. Two buff pupae over-wintered, but one blacked off. The other yielded a large female with *oleracea*-like underside and greyish *bryoniae*-patterned upperside.

(BO)² BROOD 1966-*ji*

Three females and three males of 1965-*n* were caged together in July. After five days about 260 eggs were brought in, and the males were removed (see below). In a further two weeks about 365 more eggs were laid. None hatched.

The removed three males were caged with four more *n* females. One pairing was observed. The eggs first brought in were infertile. The cage was rather neglected, and when after three weeks it was cleared, nearly 400 eggs were found. Only 28 larvae hatched: some, but not all, had pale yellow circumspiracular rings. There were losses in larval, pre-pupal and pupal stages. Four males and one female matured in September-October; five pupae over-wintered, but only one of these produced a butterfly—a male. Three of the six butterflies were crippled, including a male which had shown slight spiral segmentation as a larva.

(BO)² FAILURES

The few F₂ hybrids thus proved extraordinarily difficult to obtain. Two complete failures have been described above; in still another cage 3 females and 4 males produced about 150 eggs in 16 days, but none hatched.

(BO)² PHENOTYPES

The *jii* butterflies, as far as it was possible to examine them, had *oleracea*-pattern undersides (narrow veining on light yellow). The upperside apical patch in the males was reduced to black scaling along the veins, but two of the five had discal spots. The one female was pale ochreous, with light grey *bryoniae*-markings.

The female representing 1966-*ji* also had a whitish '*bryoniae*' upperside with somewhat reduced markings; again the underside veining was narrow.

The numbers were too small for any deductions to be made from the frequency of the different forms.

BO.O BROOD 1966-*k*

This and the following brood were intended to elucidate aspects of the inheritance of the '*bryoniae*' pattern: in particular, whether '*napi*' phenotypes can be segregated from it when no true *napi* is present.

In late June, three females of 1965-*n* were caged with three males of 1965-*oii*.

Two of the males survived less than five days, and about this time one female escaped. When about 175 eggs had been brought in (eight days) the remaining females were killed. Only 13 or 14 larvae hatched, there were no observed losses and 13 pupae over-wintered.

The pupae were involved in a refrigeration failure, but apart from one which died all produced butterflies (six females plus six males) about 20.vii.67.

O.BO BROOD 1966-*l*

Simultaneously three females of 1965-*oiii* were caged with three males of 1965-*n*. There was a pairing next morning but the insects deteriorated rapidly and only six eggs appeared. These produced two larvae, but one disappeared. The single pupa was involved in the refrigeration failure (July 1967); it gave a male entirely of *oleracea* pattern, crippled by confined emergence.

BACK-CROSS PHENOTYPES

Predominantly '*oleracea*' patterns were to be expected, and in fact appeared. Female *k4* had a *bryoniae* upperside, similar to that of female *ji1*, not departing very much from the typical F₁ phenotype. The other females had no *bryoniae* nor even *napi* pattern; the uppersides varied in the degree of shading of the veins with brown-black but only one showed a dark streak along the forewing hind margin.

The numbers, unfortunately, were not large enough to support the implication

that the entire *bryoniae* pattern is controlled by a single gene. However, though fertility was low, the back-crosses were many times better in this respect than the F₂ hybrids and with sufficient concentration of effort the experiment could be successful.

HYBRIDS, *P. NAPI OLERACEA* × *NAPI MARGINALIS*

It was originally expected that these subspecies would be fully fertile together, and the cross was attempted in one direction only. Even so, of two attempts one (using female 1966-*M*ⁱ5 with males 1965-*o*6, 29, 30) produced only infertile eggs.

MO BROOD 1966-*n*

In July a single female 1966-*M*ⁱ3 was caged with males 1965-*o*28 and 39. Many eggs were obtained. One larva and two pupae perished. Twenty-nine butterflies (including two cripples) emerged 31.viii to 19.ix.66, leaving 22 pupae to over-winter. Only one of these was green; it died when the others yielded adults in June 1967.

From 31.viii to 4.ix.66 emerged six females and two males; from 5 to 19.ix emerged three females, 13 males and four unrecorded. After diapause, 11 females emerged on 12.vi, three females and six males on 13.vi, and one male on 14.vi.67. The brood was thus definitely protogynous.

MO PHENOTYPES

All in 1966-*n* were white above, not showing the pale primrose-yellow of pure *marginalis*. All were below the average size of the parent subspecies, but too much significance should not be attached to this, as at least one of the small F₂ brood (*see below*) was large.

Most of the 'summer' emergence had little or no underside vein marking, but two females were slightly so marked. The 'spring' undersides had the marking narrow but not dense; they might be considered intermediate between *oleracea* and *marginalis*, or more like the latter.

Above, the males had only a few black scales at the apices; one had a faint discal spot. The females showed a faint *napi*-like pattern, but with the lower discal spot tending to be stronger than the upper (though not to the same degree as in *marginalis*). Spring-emerged females had more or less dusky scaling on main radiating veins.

(MO)² BROOD 1966-*t*

In September of the same year female *n*7 was caged with male *n*8; next day male *n*14 was added. The female survived for 17 days and produced perhaps about 80 eggs. From these there were, originally, 14 larvae, soon reduced to nine. The last (seventh) pupa formed on 31.x.66. Three males emerged in November and four pupae were cold-stored from 29.xii.66. These gave one male, two females and one apparently unmarked crumpled cripple, the sex of which was not determined.

(MO)² FAILURES

In view of the unexpectedly low fertility of the 1966-*t* eggs, further trials were made using the 'spring' insects of 1966-*n*.

On 14.vi.67 two females were caged with two males. After two days both females and one male were dead. On 17.vi two more females were added and on 19.vi the three butterflies looked well. One female was dead on 21.vi, when 41

eggs were brought in (but in these little or no development took place). The male died on 24.vi, and by 29.vi the remaining female was moribund. During this time only 43 more eggs were obtained; many of these were examined microscopically and found to be infertile.

Also on 14.vi.67, two further 1966-*n* of each sex were caged together. A pairing was observed next day, but all the butterflies were dead by 17.vi evening and the two eggs were infertile.

On the evidence of these experiments, *oleracea* and *marginalis* could be regarded as at least approaching full specific separation. The F_1 itself appeared to be weak.

(MO)² PHENOTYPES

Uppersides were white. Two of the males showed slight discal spots but there was little apical marking. The vein marking on the underside of the hindwing was narrow but not dense, sometimes allowing the vein to appear as a pale line. The two spring-emerged females resembled *marginalis* below; in one the veining was rather reduced. The upperside marking of the females was very much as in the MO brood; in one, the main veins were rather strongly outlined in black.

HYBRIDS, *P. napi marginalis* \times *Napi* (European)

P. napi marginalis \times *napi* (Irish)

The IM and MI crosses, and the resulting phenotypes, have been described elsewhere (Bowden 1970a).

P. napi marginalis \times *napi* (British f. *sulphurea*)

The NM, MN, (MN)² and M.NM crosses, and the resulting phenotypes, are described in the same paper. In F_1 crosses with the recessive bright yellow f. *sulphurea*, *marginalis* retained its usual lemon-yellow tinge, which however did not re-appear when a wild-type partner was used.

P. napi marginalis \times *P. bryoniae neobryoniae*

The KM cross (female *neobryoniae* \times male *marginalis*) was made successfully, but attempts to obtain MK failed. Nor did (KM)² prove possible, though there were at least two pairings. As described (*loc. cit.*), the *subtalba* form (heterozygous in the *neobryoniae*) was inherited in the usual way in the KM hybrids. The KM females were somewhat ochreous, and carried attenuated *bryoniae* markings also derived from the *neobryoniae*.

P. napi marginalis \times *P. bryoniae bryoniae*

A Swiss *bryoniae* female paired within 24 hours with a *marginalis* male (of brood 1968-*oiii*), but weather conditions in early August were bad and a total of four such females and three males produced only seven eggs (1968-*r*). Six larvae hatched and five pupae all over-wintered. In 1969 one pupa blacked: one sexual mosaic (showing *bryoniae* female marking on an ochreous background on the greater part of the right wings) and one male emerged. Two pupae were still undeveloped in December 1969 and died in the following spring.

PHENOTYPES OF EUROPEAN HYBRIDS OF *marginalis*

The retention of the pale sulphur upperside colour occurred only in hybrids with *npi* of f. *sulphurea*; otherwise the upperside was white. This followed from the dominance-series of the alleles concerned (Bowden 1970a).

In the F_1 the strong European *napi* pattern appeared fully. This was so even for the crosses with the very heavily marked Irish subspecies. In the back-cross M.NM,

both '*napi*' and '*oleracea*' types of upperside were found. The underside vein marking of the F_1 hybrids seemed to be intermediate between the parent forms, which are not always very distinct in this respect. The hindwing underside of the BM mosaic showed, as expected, a more golden yellow on the female areas.

PROTERANDRY AND PROTEROGYNY

The IM hybrids suffered from retardation of females so extreme that only one emerged, even after a 12-month 'diapause'; the other female pupae remained undeveloped and eventually died. In the reciprocal cross MI there was a preponderance of females before diapause and 9 males emerged after it.

The *sulphurea* NM hybrids also produced only male butterflies before diapause; in the spring no immediate development of either sex took place when the pupae were brought out of -5°C . On the other hand in the reciprocal cross seven males and nine females emerged and one male lay over the winter.

In the *neobryoniae* (KM) cross the whole brood lay over and was then definitely proterandrous.

In all these cases we have proterandry (sometimes disastrous) when *marginalis* is the male parent. On the other hand when female *marginalis* is paired with male *oleracea* (brood 1966-n) the brood is definitely proterogynous.

The disturbances in *marginalis* crosses with *napi* are thus in the same direction as those encountered in *bryoniae-napi* hybrids (Bowden 1953, 1957).

SUMMARY AND DISCUSSION

Comparing ssp. *oleracea* with ssp. *napi*, one notices of course the conspicuous phenotypic differences. Further, the *napi* ♀ × *oleracea* ♂ brood was strongly proterandrous (as *napi* ♀ × *bryoniae* ♂ has been found to be). However, a relatively large F_2 was easily obtained, and subsequently F_3 broods, though these last were unhealthy. In contrast the luxuriant *bryoniae* ♀ × *oleracea* ♂ hybrids gave an almost completely inviable F_2 . We conclude that reproductively *oleracea* is fairly close to *napi* and may perhaps be included in the same species. But it would not be unreasonable to separate it, in the expectation that the barriers would increase if contact were made.

Marginalis, though certainly approaching specific separation from *oleracea*, may be regarded as still conspecific with it—unless additional evidence can be adduced. The F_1 hybrids are not very distinctive. The *marginalis* ♀ × *oleracea* ♂ brood was proterogynous, as *bryoniae* ♀ × *napi* ♂ broods are. The disturbances of diapause development in European *napi* × *marginalis* were extreme. In the Irish ♀ × *marginalis* ♂ brood the females, with one late exception, failed to develop at all; the reciprocal cross was almost normal. The cross British f. *sulphurea* ♀ × *marginalis* ♂ behaved as the corresponding Irish cross; again the reciprocal was normal. Considered by themselves, these results almost justify the summary detachment of *marginalis* from *napi* (including *oleracea*?).

Crossings *bryoniae* ♀ × *marginalis* ♂ produced a total of two adults. This leaves the relation with *bryoniae* rather indeterminate, but a sexual mosaic in the F_1 speaks for possibly wide separation (cf. Bowden 1958).

The experiments on *marginalis* reported more fully elsewhere (1970a) show that it is homozygous for a recessive gene controlling sepiapterin pigmentation (which may give rise to a polymorphism in adjacent subspecies).

The relation of *P. virginianensis* to European *bryoniae* was not adequately investigated: it was with some difficulty that a few F_1 hybrids were obtained with ssp. *bryoniae* and with ssp. *neobryoniae*. But if *virginianensis* belongs in any sense

to the *bryoniae* branch of *napi*, we must probably be prepared to go back to the Pliocene for the parent stock.

Virginiensis hybrids with British *napi* were weak even in the F_1 . A large proportion of the females were crippled or quite inviable. Selected hybrids paired, but there were no eggs. Back-crosses to *napi* were obtained only when the female was *napi*, and again produced a significant deficiency of females. Faulty mitosis was detected in both F_1 and back-crosses.

Virginiensis \times *oleracea* succeeded only when the female was *virginiensis*. There was weakness in the fairly large F_1 broods, and no F_2 eggs could be obtained, though pairings took place.

These results confirm that *virginiensis* is certainly a separate species. The underside 'subtalba' character (dominant) and vaguely defined broad veining (recessive) facilitate determination as against *oleracea* of the eastern States. Hybrids, if they do occur naturally, should be easily recognisable, particularly in the spring emergence.

CONCLUSION

The three American taxa treated here are individually widely separated from European *napi*. Their separation from one another is less, though certainly that of *virginiensis* from *oleracea* reaches specific level. The evidence for specific separation of *marginalis* is at present incomplete.

REFERENCES

- Bowden, S. R., 1953. Timing of imaginal development in male and female hybrid Pieridae. *Entomologist* 86:255-264.
 —, 1956. Hybrids within the European *Pieris napi* L. species group. *Proc. S. Lond. ent. nat. Hist. Soc.* 1954-55: 135-159.
 —, 1957. Diapause in female hybrids: *Pieris napi adalwinda* and related sub-species. *Entomologist*, 90:247-254, 273-281.
 —, 1958. Sexual mosaics in *Pieris*. *Lepid. News* 12:7-11.
 —, 1966. Polymorphism in *Pieris*: 'subtalba' in *P. virginiensis*. *Entomologist* 99:174-182.
 —, 1970a. Polymorphism in *Pieris*: f. *sulphurea* in *P. napi marginalis*. *Entomologist* 103:241-249.
 —, 1970b. *Pieris napi* L.: speciation and subspeciation. *Proc. Brit. ent. nat. Hist. Soc.* 3:63-70.
 —, 1971a. American white butterflies and English food-plants. *J. Lepid. Soc.* 25:6-12.
 —, 1971b. 'Pieris napi' in America: reconnaissance. *Proc. Brit. ent. nat. Hist. Soc.* 4:71-77.
 Ford, E. B., 1964. *Ecological Genetics*. London.
 Hovanitz, W., 1963. The relation of *Pieris virginiensis* to *P. napi*: species-formation in *Pieris*? *J. Res. Lepid.* 1:124-134.
 Huxley, J., 1942. *Evolution: the Modern Synthesis*. London.
 Jordan, K., 1896. On mechanical selection and other problems. *Novit. Zool.* 3:426-525.
 Müller, L. and H. Kautz, 1939. *Pieris bryoniae* O. und *Pieris napi* L. Vienna.
 Petersen, B. and O. Tenow, 1954. Studien am Rapsweissling und Bergweissling . . . Isolation und Paarungsbiologie. *Zool. Bidr. Uppsala* 30:169-198.
 Remington, C. L. 1968. Suture-zones of hybrid interaction between recently joined biotas. *Evolutionary Biology* 2:321-428.
 Warren, B. C. S., 1967. Supplementary data on the androconial scales of some Holarctic species of *Pieris*. *Ent. Rec.* 79:139-143.
 53, Crouch Hall Lane, Redbourn, Herts.
 25th October 1971

FIELD MEETINGS

EFFINGHAM, SURREY—24th April 1971

Leader: Mr. R. F. BRETHERTON

Eight members and friends met outside Effingham station at 7 p.m. As on the previous evening meeting here in 1969, conditions were very bad; a strong north wind, after 24 hours of rain which had only ceased in the afternoon.

After members had obtained some warmth and refreshment in the 'Lord Howard', two lights were operated and much blackthorn, in full blossom, was searched on both sides of the road. Hardly a moth was seen to fly, and the main quarry, the Sloe Carpet, *Bapta distinctaria* H.-S., was *not* found, although it had been taken there a few days earlier. The lights yielded only half a dozen moths each. In all, thirteen species were seen, the only one worthy of note being *Phlogophora meticulosa* L., the date for it being very early, and it may have been an immigrant. There were also a number of noctuid larvae, including several *Lampra fimbriata* L.

The party dispersed at about 10.30 p.m., warmed by exercise if not by success.

CHOBHAM COMMON, SURREY—1st May 1971

Leader: Mrs. F. M. MURPHY

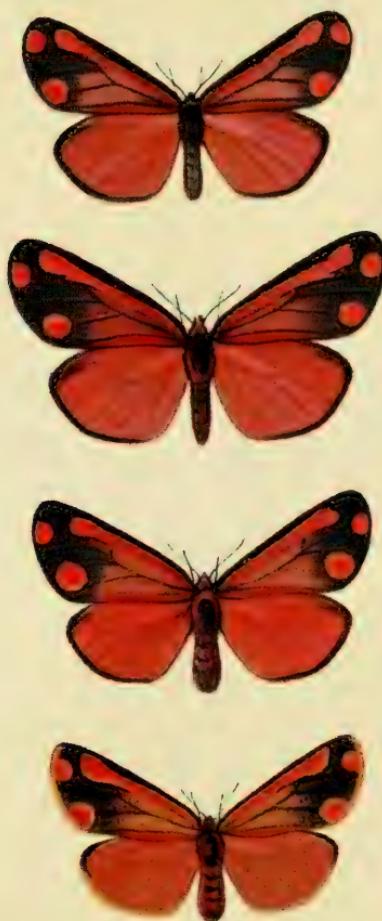
Ten members and friends attended this meeting. The morning was spent in and around the bog just east of the Gracious Pond woodland. Immature specimens of the spiders *Uloborus walckenaerius* Lat. and *Gnaphosa leporina* (L. Koch) and numerous *Agroeca brunnea* (Bl.) egg sacs were seen among the heather.

After lunch the party moved to the Long Arm. *Lithyphantes albomaculatus* (Deg.) was taken from a web in rather sparse dead heather on a recently burnt area. The moth *Phragmatobius fuliginosus* L. was taken from heather. *Adela cuprella* Thunb. which has been found on previous field meetings was not seen all day. This may be partly explained by the weather which, though sunny at times, was cold and windy.

Mr. E. S. Bradford recorded the following Lepidoptera: *Chaonia ruficornis* Hufn. on the pavement near the station, *Nymphalis io* L., *Pararge aegeria* L., *Aglais urticae* L., *Ematurga atomaria* L., *Argyrotienia pulchellana* Haw., *Laspeyresia succedana* Schiff., *Funaria casta* Pall. larval case on grass, *Coleophora ibipennella* Zell. and *C. fuscedinella* Zell. larva taken on birch.

Col. A. M. Emmet recorded *Xenolechia aethiops* Westw. on the wing and bred the following from birch: *Coleophora ibipennella* Zell., *Apotomis turbidana* Hübn. (*picana* Fröl.) and *Salebria betulae* Deg.

Spiders noted were: *Dictyna arundinacea* (L.) males, *Clubiona corticalis* (Walck.) male, *C. terrestris* Westr. male, *Xysticus cristatus* (Clerck) male and female, *Lycosa pullata* (Clerck) female, *L. amentata* (Clerck) male, *Lithyphantes albomaculatus* (Deg.) female, *Wideria nodosa* (O.P-C.), *Gnathonarium dentatum* (Wid.), *Hypomma bituberculatum* (Wid.) female, *Centromerita concinna* (Thor.) female, *Bathyphantes approximatus* (O.P-C.) female, *Linyphia montana* (Clerck) female, *L. peltata* Wid. male and *L. hortensis* Sund. female.



From the original watercolour drawing by A. D. A. Russwurm.

Aberrations of *Callimorpha jacobaeae* L.

1 and 2. ab. *basirubra* Watson ♂♂ 3 and 4. ab. *basirubra* Watson ♀♀

(Shown at the Annual Exhibition, 7th November 1970 by Mr. R. W. Watson)



BRECKLAND, SUFFOLK AND NORFOLK—23rd May 1971

Leader: Dr. M. G. MORRIS

Ten members and friends met at the Barton Mills roundabout on a dull day during which, however, the rain held off.

In the morning the party visited Thetford Heath National Nature Reserve, by kind permission of the Nature Conservancy. The heath is now managed by sheep grazing, the grassland having grown up following the myxomatosis outbreak in 1954. Insects were rather scarce, but some interesting species were taken. Mr. E. S. Bradford reported the following Lepidoptera: *Celastrina argiolus* L., *Lobesia reliquana* Hübn., *Laspeyresia succedana* Schiff., *Glyptapterix fuscoviridella* Haw., *Crambus chrysomelellus* Scop., *Neofaculta betulea* Haw., *Adela viridella* Scop., *Nemophora swammerdamella* L., and *Elachista argentella* Clerck.

Immature examples of the cricket *Myrmeleotettix maculatus* (Thunb.) were found on short turf. The only Heteroptera recorded were nymphs of *Leptopterna ferrugata* (Fall.), by sweeping, and *Calocoris quadripunctatus* (Vill.), on oak. Auchenorrhyncha were also scarce, only the common *Ulopa reticulata* (F.) and *Delpax exigua* Boh. being noted.

Some good Coleoptera were taken, the prize being a single example of *Diasticus vulneratus* (Sturm.), found by grubbing near an old bird carcass. Other species recorded included: *Anthobium unicolor* (Marsh.), *Dermestes murinus* L., *Nitidula bipunctata* (L.), *Necrobia violacea* (L.), *Aphodius coenosus* Panz. (*tristis* Zenck.), *Crypticus quisquilius* (L.), *Apion ulicis* (Forst.), *Phyllobius viridicollis* (F.), *P. maculicornis* Germ. abundant on an isolated oak, *P. pyri* (L.), *Sitona regensteinensis* (Herbst), *Micrelus ericae* (Gyll.) and *Ceuthorhynchus pumilio* (Gyll.) (*posthumus* Germ.), as usual on *Teesdalia nudicaulis* (L.) R. Br.

Mr. and Mrs. Murphy found two spiders often associated with sand dunes, *Zelotes electus* (C.L.K.) and *Attulus saltator* (Sim.); they also recorded the following species: *Dictyna arundinacea* (L.), *Drassodes lapidosus* (Walck), *D. signifer* (C.L.K.), *Zelotes pusillus* (C.L.K.), *Clubiona diversa* (O.P.-C.), *Heliophanus flavipes* C.L.K., *Euophryx frontalis* (Walck), *Lycosa monticola* (Clerck), *L. nigripecta* Thor., *Asagena phalerata* (Panz.), *Theridion impressum* L. Koch, *T. simile* C.L.K., *Enoplognatha thoracica* (Hahn), *Wideria antica* (Wid.), *Peponocranium ludicum* (O.P.-C.), *Agynta subtilis* (O.P.-C.), *Heioneta ruprestris* (C.L.K.), *Leptphyphantes mengei* Kulcz., *L. ericaceus* (Bl.) and *Linyphia clathrata* Sund.

After lunch the party went to Thompson Common, Norfolk, permission having been obtained for the Society by the Nature Conservancy's Assistant Regional Officer for Breckland. The Common is botanically very varied and contains much interesting marshland vegetation. Among the more unusual plants seen were *Menyanthes trifoliata* L., *Hippuris vulgaris* L. and *Hottonia palustris* L.

Lepidoptera recorded included the following: *Anthocharis cardamines* L., *Pieris napi* L., *Pararge megera* L., *Micropteryx calthella* L., *M. mansuetella* Zell., *Glyptapterix fuscoviridella* Haw., *Ancylis badiana* Schiff., *Epiblema costipunctana* Haw., *Grapholita jungiella* L., *G. internana* Guen. and *Laspeyresia succedana* Schiff.

The Heteroptera, taken from their usual foodplants, included *Acompus rufipes* (Wollf), *Ischnodemus sabuleti* (Fall.), *Cymus glandicolor* Hahn, *Dictyla convergens* (H.-S.), *Harpocera thoracica* (Fall.), *Dicyphus stachydis* Reut. and *Calocoris quadripunctatus* (Vill.).

Coleoptera, particularly the phytophagous species, were abundant, the following species being noted: *Elaphrus cupreus* Dufts., *E. riparius* (L.), *Eusphalerum torquatum* (Marsh.), *Cantharis pallida* Goeze, *Phyllotreta nodicornis* (Marsh.),

Hippuriphila modeeri (L.) was abundant, *Epitrix pubescens* (Koch), *Psylloides affinis* (Payk.), *Apion virens* Herbst, *A. dichroum* Bedel, *Phyllobius pomaceus* Gyll., *P. calcarius* (F.), *Polydrusus cervinus* (L.), *Anthonomus rubi* (Herbst), *Ceuthorhynchus melanostictus* (Marsh.), *C. quadridens* (Panz.), *Amalorrhynchus melanarius* (Steph.), *Drupenatus nasturtii* (Germ.), *Gymnetron pascuorum* (Gyll.), *G. labile* (Herbst), *G. villosulum* Gyll. and *G. veronicae* (Germ.), the last being particularly abundant on its foodplant *Veronica beccabungae* L.

The spider fauna was rich, with the following species being noted: *Dictyna arundinacea* (L.), *D. uncinata* Thor., *Clubiona reclusa* O.P.-C., *Lycosa pullata* (Clerck), *Pirata hygrophilus* Thor., *P. latitans* (Bl.), *Theridion pictum* (Walck.), *T. bimaculatum* (L.), *Pachygnatha clercki* Sund., *Araneus cucurbitinus* Clerck, *Dismodicus bifrons* (Bl.), *Hypomma bituberculatum* (Wid.), *Pocadicnemis pumila* (Bl.), *Oedothorax tuberosus* (Bl.), *Porrhomma pygmaeum* (Bl.), *Meioneta saxatilis* (Bl.), *Bathyphantes approximatus* (O.P.-C.), *B. pullatus* (O.P.-C.), *B. gracilis* (Bl.), *Leptyphantes tenuis* (Bl.), *L. ericaeus* (Bl.), *Linyphia montana* (Clerck), *L. peltata* Wid. and *L. impigra* O.P.-C.

The members who attended the meeting had an interesting and enjoyable day and saw some rich and varied countryside, grass-heathland and fen being the two most important types represented in the Breckland.

BLEAN WOODS AND HAM STREET, KENT—29th May 1971

Leader: Mr. J. M. CHALMERS-HUNT

A fine day with almost continuous sun favoured the ten lepidopterists who met at the Fox and Hounds, Herne Common, an old inn with entomological associations dating back to the 1860's.

Throughout the day, the party worked some of the extensive woodland adjoining the inn, known as West Blean Wood and Thornden. Of the butterflies seen, both sexes of *Clossiana euphrosyne* L. were plentiful and in good condition, and full-grown larvae of *Quercusia quercus* L. were beaten in numbers from the oaks. The larva of *Mellicta athalia* Rott. was found, but no imagines were seen, so it was presumed the insect was not yet out; and among the other butterflies observed were *Lycaena phlaeas* L. and *Pararge megera* L.

Of the numerous microlepidoptera noted, some of the more interesting were *Pyrausta funebris* Stroem and *Olethreutes arcuella* L., several of each were flying in the sun. Larvae of *Paltodora cytisella* Curt. were frequent in the shortened side shoots of bracken; and from a larva beaten from oak, the leader was delighted to breed an example of the local gelechiid, *Psoricoptera gibbosella* Zell.

The original intention was for this to be an overnight two-day meeting, but owing to the postal strike, booking arrangements to put up locally so as to be able to work the area the following day had to be abandoned. At the close of the day therefore, the leader and several members of the party decided to drive into the Weald and to operate mercury vapour lights at Orlestone Woods, Ham Street. Despite a cool night with two short rain spells, there was a fair concourse at the lights, and among the more interesting species attracted were the beautiful *Tethea fluctuosa* Hübn., and the local aspen-feeding pyralid *Nephopteryx hostilis* Steph.

Among the other Orders at Blean Woods, Mr. I. A. Watkinson took an example on Vetch of *Lasius fuliginosus* (Lat.), and a new record for this interesting ant for Blean. Curiously, most of the recent records of this species from around this area seem to be from Vetch plants. The same observer also took *Tetrix*

undulata (Sowerb.) the commonest of the tettigids in this country. We are indebted to Mr. John Felton for both the determinations.

WICKEN FEN, CAMBS—6th June 1971

Leader: Col. E. M. EMMET

In spite of early rain which was followed by cool, overcast weather, 17 members were present. They were rewarded by the quality, if not the quantity, of their captures.

Of the macrolepidoptera, *Eustrotia bankiana* F. was plentiful in its satellite colony at the head of the main drove; there was no time to visit its headquarters in the heart of the fen.

The microlepidopterists did well. Seven species were added to the list for the fen, namely *Schiffermuelleria angustella* Hübn., *Incurvaria masculella* Schiff., *Luffia ferchaultella* Steph. (larval cases), *Elachista megerrella* Staint., *Argyresthia cornella* F., *Endothenia nigricostana* Haw. and *Acornutia nana* Haw. The presence of six other species for which there had been no recent records (in most cases for more than a century) was confirmed. These were *Lampronia rubiella* Bjerk., *Adela croesella* Scop., *Glyptipteryx simplicella* Steph. (*fischeriella* Zell.), *Coleophora striatipennella* Nyl., *Schiffermuelleria tripuncta* Haw. and *Pammene obscurana* Steph.

The last of these species is a distinct rarity. It was recorded from Wicken by Lord Walsingham some time prior to 1878 and, as far as is known, has not been seen there since. Its life-history is unknown in Britain, but continental writers state that the larva feeds in birch catkins. The field meeting specimen was netted near birches by Mr. L. K. Evans and generously presented to the writer.

Two moths in particular were looked for, but found only in small numbers owing to unfavourable weather. These were *Dechtria turbidella* H.-S. and *Laspeyresia leguminana* Zell. Among the many other species taken and noted were *Nepticula splendidissinella* H.-S. and *Bucculatrix albedinella* Zell. (*boyerella* Dup.). Various larvae were taken, from which imagines were subsequently bred. These included *Luffia ferchaultella* (see above), *Aristotelia morosa* Mühl. and *Gypsonoma aceriana* Dup.

Mr. and Mrs. Murphy were there to study the spiders. They state: 'At Wicken everything is upside down, rare spiders are common and a number of the common ones are rare or at least unrecorded.' They noted nearly 50 species, of which three were new to both the fen and to Cambridgeshire. These were *Agyneta subtilis*, O.P.-Camb. *A. ramosa* Jackson and *Bathyphantes approximatus* (O.P.-Camb.).

WHITE DOWNS, SURREY—12th June 1971

Leader: Mr. R. F. BRETHERTON

Five members attended this evening meeting, which continued until after midnight. Conditions were bad; chilly, with some rain, after a deluge in the late afternoon and a cold, wet week.

Nevertheless, with the help of four lights about 60 species of Lepidoptera were seen, including three hawk moths, *Sphinx ligustri* L., *Mimas tiliae* L., and *Deilephila porcellus* L.; *Stauropus fagi* L., *Hadena contigua* Schiff., and the

chalk-down specialities *Scopula ornata* Scop., *Melanthis procellata* Schiff. and *Horisme vitalbata* Schiff. Six species of butterflies were found at rest, including *Lysandra bellargus* Rott. and *Aricia agestis* Schiff., and also two female *Diacrisia sannio* L. No Tortricidae or Tineidae were flying, and the soaking conditions made searching for larvae impracticable. These results do not do justice to a locality which in good weather is very rewarding.

ALDERSTEAD HEATH, SURREY—20th June 1971

Leader: Mr. K. G. W. EVANS

A combined meeting with the Croydon Natural History Society produced an attendance of ten despite the drizzle and, at times, heavy showers that marred the morning.

For the lepidopterists the chief quarry was *Eupithecia indigata* Hübn. which occurs here but, despite much searching of the pine trunks, none was found.

Macrolepidoptera were in short supply and the list comprised: imagines—*Coenonympha pamphilus* L., *Polyommatus icarus* Rott., *Pieris rapae* L., *Ochloides venata* Br. & Grey, *Agrotis exclamationis* L., *Rivula sericealis* Scop., *Zanclognatha nemoralis* F., *Xanthorhoe montanata* Schiff., *X. fluctuata* L., *X. spadicaria* Schiff., *Perizoma affinitata* Steph., *Lomaspilus marginata* L., *Deilinia pusaria* L., *Pseudoboarmia punctinalis* Scop. Larvae—*Orthosia stabilis* Schiff., *Scoliopteryx libatrix* L., *Erannis marginaria* F. and *Eupithecia centaureata* Schiff. were found on sallow, *Orthosia incerta* Hufn. on bramble, and on maple two larvae of *Eupithecia inturbata* Hübn. both, unfortunately, infested with a hymenopterous parasite.

Microlepidoptera proved to be more numerous with *Crambus pratellus* L., *C. pascuellus* L., *C. hortuellus* Hübn., *Scoparia ambigualis* Treits., *Argyrotoza conwagana* F., *Argyroploce urticana* Hübn., *Olethreutes lacunana* Schiff., *Ptycholoma lecheana* L., *Lathronympha strigana* F., *Acronutria nana* Haw., *Eriopsela quadvana* Hübn., *Dichrorampha plumbagana* Treits., *Brachmia rufescens* Haw. and *Argyresthia pygmaeella* Hübn.

Coleoptera provided by far the most rewarding collecting, mostly by beating and sweeping, and the following interesting list developed: *Notiophilus palustris* (Dufts.), *N. biguttatus* (F.), *Bembidion lampros* (Herbst), *Tachyporus obtusus* (L.), *Eusphalerum primulae* (Steph.), *Calvia quatuordecimguttata* (L.), *Rhyzobius litura* (F.), *Brachypterus urticae* (F.), *B. glaber* (Steph.), *Brachypterolus pulicarius* (L.), *Laria dulcamarae* Scop., *Meligethes atratus* Ol., *M. brunnicornis* Sturm., *M. viridescens* (F.) and ab. *discolor* Reitter, *M. aeneus* (F.) *Malachius bipustulatus* (L.), *Grammoptera ruficornis* (F.), *Psylloides affinis* (Payk.), *Phyllotreta nigripes* (F.), *Apion meliloti* Kirby, *A. minutum* Germ., *Deporaus mannerheimi* Hummel, *Barypithes aranaeiformis* (Schrank), *Polydrusus tereticollis* (Deg.), *Phyllobius maculicornis* Germ., *P. pyri* (L.), *P. viridiaefer* (Laich.), *P. argentatus* (L.), *Circulio (Balanobius) pyrrhoceras* (Marsh.), *Stenocarus fuliginosus* (Marsh.), *Gymnetron pascuorum* (Gyll.), *Ceuthrohynchus floralis* (Marsh.), *Dorytomus dejeani* Faust. and *D. tortrix* (L.).

The only hemipteron recorded was *Elasmucha grisea* (L.).

After lunch the party moved to Riddlesdown, a few miles away. A search was made for *Eupithecia subumbra* Schiff. and *E. pimpinellata* Hübn., for both are known to occur here, but neither species appeared. Beating yielded many *Euphyia bilineata* L. Butterflies were seen: *Maniola jurtina* L., *Polyommatus icarus* Rott. and *Coenonympha pamphilus* L.

The list of Coleoptera included: *Megarthrus denticollis* (Beck), *Rhyzobius litura* (F.), *Phalacrus coruscus* (Panz.), *Isomira murina* (L.), *Chrysolina polita* (L.), *C. hyperici* (Forst.), *Cryptoccephalus labiatus* (L.), *C. hypochaeridis* (L.), *Psylliodes affinis* (Payk.), *Rhagonycha limbata* Thoms., *Limonius minutus* (L.), *Apion apricans* Herbst, *A. ebeninum* Kirby, *Gymnetron pascuorum* (Gyll.), *Miccotrogus picirostris* (F.), *Ceuthorrhynchideus troglodytes* (F.) and *Phyllobius parvulus* (Ol.).

STANFORD-LE-HOPE, ESSEX—3rd July 1971

Leader: Mr. R. TOMLINSON

Ten people met at Stanford-le-Hope station at 10.30 a.m. for the joint meeting of our Society and the South Essex Natural History Society. These included four of our members: Dr. B. J. MacNulty, Mr. E. S. Bradford, Mr. G. Prior and the leader: Mrs. N. Mansbridge and Miss N. Scarfe from the S.E.N.H.S. and four visitors.

The party drove to Mucking Church, parked and ventured along the footpath between the reed-beds to a local fishing lake, the 'Warren'. Later several of the party repaired to the Linford 'George & Dragon' for refreshment and lunch; by then we had been joined by two other people.

In the afternoon we drove to Langdon Hills, a few miles away, and worked our way through Coombe Wood. Afterwards as most of the party went their several ways Mr. Bradford and Mr. Prior went home with the leader to sort through the mercury vapour light trap captures of the previous night, which he does not release until dusk the next evening to save them from the depredations of the local bird populace.

It was a cloudy, mild day, and not an unsuccessful meeting, particularly for plants and microlepidoptera.

The following species were recorded:

MUCKING:

Lepidoptera:

Agrotis exclamationis L., *Axylia putris* L., *Euphyia bilineata* L., *Ourapteryx sambucaria* L., *Chiasmia clathrata* L., *Acentropus niveus* Ol., *Scoparia dubitalis* Hübn., *S. ambigualis* Treits., *Crambus hortuellus* Hübn., *Agapeta hamana* L., *Platyptilia pallidactyla* Haw., *Phalonidia affinitana* Dougl., *Stenodes straminea* Haw., *Amelia paleana* Hübn., *Pseudoargyrotoza conwayana* F., *Cnephacia communana* H.-S., *Notocelia uddmanniana* L., *Epinotia tedella* Clerck, *Bactra lanceolana* Hübn., *Apotomis pruniana* Hübn., *Celypha striana* Schiff., *Telphusa notatella* Hübn., *Scrobipalpa atriplicella* F.R., *Anthophila fabriciana* L., *Poraswammerdamia lutarea* Haw. and *Nemotois degeerella* L.

Flowering plants:

Ranunculus scleratus L. (Celery-headed Buttercup), *Papaver rhoeus* L. (Corn Poppy), *Sinapis arvensis* L. (Charlock), *Cardaria draba* L. (Desv.) (Hoary Cress), *Sisymbrium officinale* (L.) Scop. (Hedge Mustard), *Silene dioica* (L.) Clairv. (Red Campion), *S. alba* (Mill.) Krause (White Campion), *Stellaria graminea* L. (Lesser Stitchwort), *Spergularia rubra* (L.) J. & C. Pressl. (Sand Spurry), *Chenopodium glaucum* L. (Oak-leaved Goose-foot), *Beta vulgaris* L. (Sea Beet), *Halimione portulacoides* (L.) Aell. (Sea Purslane), *Malva sylvestris* L. (Common Mallow),

Geranium molle L. (Dove'sfoot Cranesbill), *G. dissectum* L. (Cut-leaved Cranesbill), *G. pusillum* L. (Small-flowered Cranesbill), *Sarothamnus scoparius* (L.) Wimmer (Broom), *Trifolium pratense* L. (Red Clover), *T. repens* L. (White Clover), *T. arvense* L. (Hare'sfoot Clover), *Ornithopus perpusillus* L. (Common Bird'sfoot), *Vicia hirsuta* (L.) (S. F. Gray) (Hairy Tare), *V. tenuissima* (M. Bieb.) Schinz & Thell. (Slender Tare), *V. sativa* L. (Common Vetch), *Potentilla reptans* L. (Creeping Cinquefoil), *Rosa canina* L. (Dog Rose), *Epilobium hirsutum* L. (Great Willow-herb), *Conium maculatum* L. (Hemlock), *Heracleum sphondylium* L. (Hogweed), *Bryonia dioica* Jacq. (White Bryony), *Rumex pulchra* L. (Fiddle Dock), *Anagallis arvensis* L. (Scarlet Pimpernel), *Glaux maritima* L. (Sea Milkwort), *Veronica persica* Poir. (Common Speedwell), *Ballota nigra* L. (Black Horehound), *Lamium album* L. (White Deadnettle), *L. amplexicaule* L. (Henbit), *Plantago lanceolata* L. (Ribwort Plantain), *P. coronopus* L. (Buckshorn Plantain), *Sambucus nigra* L. (Elderberry), *Senecio squalidus* L. (Oxford Ragwort), *Arctium minus* Bern. (Burdock), *Cirsium arvense* (L.) Scop. (Creeping Thistle), *Tripleurospermum maritimum* (L.) Koch (Scentless Mayweed), *Matricaria matricarioides* (Less.) Porter, *Hypochoeris radicata* L. (Common Cat'sear), *Hieracium pilosella* L. (Mouse-ear Hawkweed), *Asparagus officinalis* L. (Asparagus), *Juncus bufonius* L. (Toad Rush), *Parietaria diffusa* Mert & Koch (Pellitory-of-the-Wall), *Artemisia vulgaris* L. (Mugwort), *Sonchus arvensis* L. (Corn Sowthistle), *S. oleraceus* L. (Smooth Sowthistle), *S. asper* (L.) Hill (Prickly Sowthistle) and *Solanum dulcamara* L. (Woody Nightshade).

COOMBE WOOD, LANGDON HILLS:

Lepidoptera:

Scoparia dubitalis Hübn., *S. ambigualis* Treits., *Archips oporana* L., *Croesia bergmanniana* L., *Olethreutes lacunana* Schiff., *Anacampsis populella* Clerck (bred), *Poraswammerdamia lutarea* Haw. and *Prays curtisellus* Don.

Flowering plants:

Ranunculus repens L. (Creeping Buttercup), *Silene dioica* (L.) Clairv. (Red Campion), *Stellaria graminea* L. (Lesser Stitchwort), *Malva moschata* L. (Musk Mallow), *Geum urbanum* L. (Herb Bennet), *Rosa canina* L. (Dog Rose), *Prunus spinosa* L. (Blackthorn), *Chamaenerion angustifolium* (L.) Scop. (Rosebay Willowherb), *Circaeaa lutetiana* L. (Enchanter's Nightshade), *Heracleum sphondylium* L. (Hogweed), *Humulus lupulus* L. (Hop), *Myosotis arvensis* (L.) Hill (Common Forget-me-not), *Digitalis purpurea* L. (Foxglove), *Veronica chamaedrys* L. (Birdseye Speedwell), *V. serpyllifolia* L. (Thyme-leaved Speedwell), *Glechoma hederacea* L. (Ground Ivy), *Teucrium scorodonia* L. (Wood-sage), *Galium palustre* L. (Marsh Bedstraw), *Sambucus nigra* L. (Elderberry), *Lonicera periclymenum* L. (Honeysuckle), *Palicaria dysenterica* (Common Fleabane), *Hieracium pilosella* L. (Mouse-ear Hawkweed), *Endymion non-scripta* (L.) Sarcke (Bluebell), *Pteridium aquilinum* (L.) Kühn (Bracken), *Dryopteris dilatata* (Hoffm.) A. Gray (Common Buckler Fern) and *Tamus communis* L. (Black Bryony).

STANFORD-LE-HOPE in leader's mercury vapour light trap:

Lepidoptera:

Procas fasciuncula Haw., *Parapoynx stratiotata* L., *Scoparia dubitalis* Hübn., *Udea olivalis* Schiff., *Ostrinia nubilalis* Hübn., *Myelois cibrumella* Hübn., *Cochylis hybridella* Hübn., *Lozotaenia forsterana* F., *Cnephasia chrysanthanea*

Dup., *Spilonota ocellana* Schiff., *Epiblema farfara* Fletch., *Epinotia trimaculana* Don., *Ancylis achatana* Schiff., *Apotomia pruniana* Hübn., *Celypha striana* Schiff., *Telphusa fugitivella* Zell., *Brachmia rufescens* Haw., *Blastobasis decolorella* Woll., *Coleophora anatipennella* Hübn., *C. lineola* Staint., *C. peribenanderi* Toll, *C. flaviginella* Zell., *C. atriplicis* Durr. and *Eidophasia messingiella* F.R.

WATLINGTON HILL, OXON.—17th July 1971

Leader: Mr. E. S. BRADFORD

As no one met the leader at Henley station on this very pleasant day he proceeded alone to Watlington Hill and the area of the Pilgrim's Way where previous field meetings had taken place.

Some time was spent collecting leaf mines and one of the interesting things found were mines of *Stigmella paradoxa* Frey. in the leaves of hawthorn, which proved to be a new county record for this moth. Mines of *Lyonetia clarkella* L. were also found in hawthorn leaves, and in apple, where a number of leaves were taken containing the blotch mines of *Dechtria pulverosella* Staint.

Eight species of butterfly were seen, *Aphantopus hyperantus* L. seeming the more plentiful. Several *Lysandra coridon* Poda, all in fairly fresh condition, were observed, and other species noted during the day were: *Maniola jurtina* L., *Coenonympha pamphilus* L., *Melanargia galathea* L., *Aglais urticae* L., *Polyommatus icarus* Rott. and *Thymelicus sylvestris* Poda.

Two well-eaten plants of *Verbascum thapsus* L. (Mullein) were found, containing one full-fed larva of *Cucullia verbasci* L. in each, and from the amount of frass around, a number of larvae had been busy on the plants. An example of *Eupithecia sobrina* Hübn. and one of *Argyresthia aurulentella* Staint. were tapped out of *Juniperus communis* L. (Juniper).

Other species of Lepidoptera seen or taken during the day were: *Nola cucullatella* L., *Callimorpha jacobaeae* L., larvae, *Plusia gamma* L., *Hemitelea aestivaria* Hübn., *Ortholitha chenopodiata* L., *Astheona albulata* Hufn., *Opsibotys fuscalis* Schiff., *Haritalia ruralis* Scop., *Microstega hyalinalis* Hübn., *Crambus perlellus* Scop., *Stenoptilia bipunctidactyla* Scop., *Pterophorus tetracadytulus* L., *Agapeta hamana* L., *Pandemis heparana* Schiff., *P. cerasana* Hübn., *Batodes angustiorana* Haw., *Pseudargyrotoza conwagana* F., *Acleris variegana* Schiff., *Dichrorampha petiverella* L., *Laspeyresia aurana* F., *Olethreutes lacunana* Schiff., *Telphusa vulgella* Hübn., and *Anthophila fabriciana* L., plus several species not yet identified.

CADSDEN, BUCKS.—25th July 1971

Leader: Mr. E. S. BRADFORD

Two members convened for this meeting which began with weather that was cloudy, somewhat windy, and very near to rain for the greater part of the day; but it did brighten and become more pleasant during the afternoon with some sunshine. It was during these sunny periods that the leader had the interesting, but frustrating, task of trying to photograph specimens of *Nemotois metallicus* Poda. on the flower-heads of *Knautia arvensis* (L.) Coult. (Field Scabious). With a breeze swaying the heads of the flowers it was a little difficult keeping things in focus and some dark oaths were uttered. However, the resulting transparencies

were well worth the frustration. A number of this moth appeared when the sun shone and it was a pleasing sight to see them around the scabious. On one or two occasions the leader had the interesting experience of watching a female laying her eggs in the flower-heads.

A number of leaves containing mines were collected from beech, hawthorn and hazel; the leaves from hazel later produced *Nepticula floslactella* Haw. Several specimens of *Euphyia bilineata* L. were disturbed during the day and single specimens of *Philereme transversata* Hufn., *Colostygia pectinataria* Knobch and *Ortholitha bipunctaria* Schiff. were observed. Only one butterfly, *Pieris rapae* L. was seen.

Other Lepidoptera noted were: *Laspeyresia aurana* F., *Lithoccolletis faginella* Zell., *Pseudoargyrotoza conwagana* F., *Dichrorampha gueneeana* Obrat., *Pyrausta nigrata* Scop., *P. aurata* Scop., *Phalonia rubigana* Treits. and *Epiblema farfarae* Fletcher.

Anacamptis pyramidalis (L.) Rich. (Pyramid Orchid) was in flower and a number were seen.

BOOKHAM COMMON, SURREY—15th August 1971

Leader: Mr. ALAN E. STUBBS

This meeting was the first to be held entitled 'Introduction to the study of Diptera in the Field'. Despite dull weather, twelve members, friends and visitors from the Amateur Entomological Society attended.

Apart from 15 minutes' sunshine midday, the weather was dull, but Diptera were readily obtained. The good display of umbelliferous flowers was a strong attraction for Diptera on the plains as hoped, and provided plenty of scope for syrphids and other showy species. Sweeping produced good hauls of the smaller groups. The woodland was on the whole too dark under overcast conditions, but some useful additional species were found there, as well as round the Isle of Wight pond. Representatives of most families were available for study and overall the locality proved ideal for a meeting of this sort.

Bookham has the largest recorded dipterous fauna in Britain, largely due to the efforts of our late member Mr. L. Parmenter, there being some 1,140 species listed. During the course of the meeting ten further species were added.

It is interesting to note that most of the additional records came from managed areas. In the list below, Central Plain refers to the area near the station which was cleared of scrub by the Conservation Corps in the early 1960's. This area has a profusion of flowers between scattered bushes and is in excellent condition entomologically, though ultimately further management will be required. The dense oak woodland along Hollow Path, heavily thinned in recent years by the National Trust working party, is still recovering, but there should be an improvement in a few years' time.

It was the cut ends of a stack of oak logs (?cut last winter) that provided two of the ten new species listed below: *Pseudolimnophila lucorum* (Meig.) (Tipulidae), a single example in the shaded marsh below the Isle of Wight pond; *Tipula fulvipennis* Deg. (Tipulidae), a male on Hollow Path; *Neoplatyura modesta* (Winn.) (Mycetophilidae), a male swept off birch on Central Plain; *Drymonoea (Eutarsus) aulica* (Meig.) (Dolichopodidae), two males swept on Central Plain; *Opetia nigra* Meig. (Platypezidae), a single example swept on Central Plain close to the station; *Pherbellia griseola* (Fall.) (Sciomyzidae), a single female on

Central Plain; *Chymomyza fuscimana* (Zett.) (Drosophilidae), approximately ten examples found on logs on Hollow path; *Fannia incisurata* (Zett.) (Muscidae), a single example on logs on Hollow Path; *Calythea albicincta* (Fall.) (Anthomyidae), one on *Torilis japonica* (Houtt.) DC. (Hedge Parsley) on Central Plain.

Neoplatyura modesta, *Drymonoecea aulica*, *Chymomyza fuscimana* and *Calythea albicincta* are probably also new county records and certainly new to the London area (*sensu* LNHS).

Among the more interesting ecological observations was the abundance of the trypetid fly *Phagocarpus permundus* Harris on *Silaum silaus* (L.) Schinz & Thellung (Pepper Saxifrage). The fly was only found on the occasional patch of this plant, all others being apparently ignored. Niblett found it widespread on the Common, but always in low numbers; here it was possible to sweep through a few plants and find a dozen flies in the net. Its larvae live in hawthorn berries.

The more pleasing species found on Central Plain included the syrphid *Helophilus trivittatus* (F.), the conopid *Physocephala rufipes* (F.) and the calliphorid *Pachyopthalmus signatus* (Meig.) on parsnip flowers.

Despite the title of the meeting, other groups of insects were not ignored. It is encouraging to report drones of both species of tree wasps, *Vespa sylvestris* (Scop.) and *V. norvegica* (F.) on Wild Angelica flowers. The latter wasp is particularly local in Surrey. Lepidoptera included a second brood *Clossiana selene* Schiff. (Small Pearl-bordered Fritillary), a *Lycaena phlaeas* L. (Small Copper) with joined spots on the forewing and a full grown larva of *Deilephila elpenor* L. (Large Elephant Hawk); all found on Central Plain.

HATFIELD PARK, HERTS.—28th August 1971

Leader: Mr. E. S. BRADFORD

The seven members who met at Hatfield station for this meeting were mainly microlepidopterists, who spent a very interesting day in the extensive area of Hatfield Park, only a small part of which was explored by the party.

Leaf mining and Lepidoptera attracted a lot of attention and numerous leaves were collected from various trees. Those taken from hawthorn contained mines of *Leucopetra scitella* Zell., *Nepticula pygmaeella* Haw., and either *Stigmella hybnerella* Hübn. or *Nepticula ignobilella* Staint. Perhaps the most interesting find on hawthorn was a number of mines of *Stigmella paradoxa* Frey. which is a new species for Herts. A few leaves on birch were found to contain mines of *Nepticula lapponica* Wocke and *Nepticula hemargyrella* Koell. Leaves mined by *Stigmella basiguttella* Hein. and *Dechiria albifasciella* Hein. were collected from oak and several nearby saplings of black poplar were inspected and leaves taken which had been inhabited by *Nepticula trimaculella* Haw. One cocoon found on the trunk of a sycamore was thought to be that of *Etainia decentella* H.-S.

Two species of butterfly, *Lycaena phlaeas* L. and *Pieris rapae* L. were observed during the day and the following moths either seen or taken: *Agriphila culmella* L., *Batodes angustiorana* Haw., *Lithocolletis oxyacantheae* Frey., *L. faginella* Zell., *L. corylifoliella* Haw., *L. cramerella* L., *Acleris sparsana* Schiff., *Rhopobota naevana* Hübn., *Udea lutealis* Hübn., *Haritalia ruralis* Scop., *Calothysanus amata* L., *Parornix anglicella* Staint. and *Xanthorhoe fluctuata* L.

Some vacated cones on birch were considered to be those of *Caloptilia betulicola* Her., and mines of *Mompha raschkiella* Zell. were noted on *Epilobium* spp.

A shieldbug which seemed to be fairly common was *Acanthosoma haemorrhoidalis* L.

KNOLE PARK, KENT—12th September 1971

Leader: Mr. S. A. Williams

A dry and very warm day with very little wind was enjoyed by the party of 18 members and their families who attended this meeting. The occasion provided an opportunity to demonstrate in the field some of the methods used in the collecting of beetles that were discussed at a recent indoor meeting at the Society's rooms.

The morning was spent searching the abundant deer and horse dung for the species of *Aphodius* and *Oxytelus*. A search was made for *Leistus rufomarginatus* (Dufts.) under stones lying in the shade of trees near the main entrance, it having been taken there last year; however we were unsuccessful this time.

After lunch a demonstration of the leader's 'autokatcher' was arranged and although great interest was taken and several runs made, the net, fixed to the roof of a motor car caught few beetles, although several Diptera were tubed by Mr. A. Stubbs.

A move was then made towards the central part of the park where fallen beech and oak trees could be expected. The party soon settled itself around a small group of perhaps six oak logs and the remainder of the day was spent stripping the bark and working several species of fungus living on the dead wood and in the immediate vicinity. The party dispersed at 4 p.m. after a very pleasant and rewarding day.

The beetles taken were as follows: *Siagonum quadricorne* Kirby & Spence, *Proteinus ovalis* Steph., *Hapalaraea pygmaea* (Gyll.), *Phloeonomus punctipennis* Thom., *Oxytelus sculpturatus* (Grav.), two species of *Oxytelus* not yet on the British list, *Philonthus fimetarius* (Grav.), *Gabrius splendidulus* (Grav.), *Oligota picipes* Steph. in the usual biotope of a dead and dried out pigeon, *Gyrophaena nana* (Payk.), *G. minima* Er., *Bolitochara obliqua* Er., *Atheta pallidicornis* (Thom.), *A. gregaria* (Er.), *A. aequata* (Er.), *A. castanoptera* (Mann.), *A. crassicornis* (F.), *Drusilla canaliculata* (F.), *Oxypoda alternana* (Grav.), *Anomognathus cuspidatus* (Er.), *Bibloporus bicolor* (Denny), *Scaphisoma agaricinum* (L.) and *Aphodius zenkeri* Germ.

PROCEEDINGS

23rd SEPTEMBER 1971

The President, Col. A. M. EMMET, in the Chair

The President welcomed to the meeting Dr. Hiroshi Kuroko, Associate Professor in the University of Osaka, Japan.

The following new member was declared elected: Mr. S. D. Mackey.

EXHIBITS

Col. A. M. EMMET—(1) A series of *Falseuncaria degreyana* McLach. (Lep., Phaloniidae) from East Wretham, Norfolk, taken flying over *Linaria*, one of its foodplants; it is also reputed to feed on plantain. Apart from East Anglia it has been recorded from Portishead, Somerset; but Col. Emmet is somewhat doubtful of this because the terrain is so different from the East Anglian localities favoured by this species. (2) The feeding habits of *Phylloconistis saligna* Zell. (Lep., Lithocolletidae) in the shape of leaves and twigs of *Salix fragilis* L. The exhibitor said that Ford's description of the mine was, in his experience, not entirely accurate. Most of the larval life he found was spent in the thin bark of the twigs. The mine certainly commenced in the leaf, but after a little wandering it struck the midrib and then turned straight down the midrib through the petiole of the leaf into the twig, spending the major part of its larval life in this pabulum. When nearing pupation it entered another leaf through the petiole, folded over the leaf and pupated within the fold. The insect always mines the underside when in the leaf. The moth is bivoltine, the second brood being on the wing about the present time of the year. It hibernates as an imago and produces the first brood of the year in the spring. *Phylloconistis saligna* Zell. is quite local, but was abundant in a small area at Chippenham, Cambs., just outside the fen.

Mr. S. A. WILLIAMS—*Gyrophaena joyoides* Wusthoff. (Col., Staphylinidae), taken in fungi growing in Blean Wood, Kent, 9.ix.71; and *Atheta pallidicornis* (Thoms.) (Col., Staphylinidae), taken in Knole Park, Kent, 11.ix.71, in a species of white bracket fungus on oak.

Mr. E. S. BRADFORD—An elm leaf with three vacated mines of *Coleophora badiipennella* Dup. (Lep., Coleophoridae) from Enfield Road, Middlesex. The leaf containing the small mines was collected on 21st August and the larvae left the mines during the first week of September. Their first cases were made from the oval pieces cut from the mined areas of the leaf.

Dr. P. A. BOSWELL—Insects from the southern end of the French Atlantic coast; all exhibiting some cryptic coloration: *Eurynebria complanata* (L.) (Col., Carabidae), a *Phaleria* species (Col., Tenebrionidae), *Labidura riparia* (Pallas) (Derm., Labiduridae) and an un-named homopteron.

Mr. C. R. B. BAKER—Living adults of *Haltica carduorum* Guer. (Col., Chrysomelidae) from a stock originating from Nantes, France. Beetles from this source were released in two areas in Britain in 1969 and 1970 as part of a study of the biological control of *Cirsium arvense* (L.) Scop. (Creeping Thistle). Releases were made by Dr. R. Blackman at Silwood Park, Berks, and by Dr. M. F. Claridge at three sites near Cardiff. Imagines, eggs and larvae were found on the release sites in 1969 and 1970, but none has been seen this year.

Mr. A. E. GARDNER—(1) *Carabus arvensis* Herbst (Col., Carabidae), a green example taken on Setley Plain in the New Forest, Hants, 12.ix.71. (2) A short series

of *Lithocharis nigriceps* Kraatz (Col., Staphylinidae) taken in vegetable litter near Stoney Cross, New Forest, Hants, 12.ix.71. This species, of oriental origin, was first recorded in Britain by A. A. Allen (1962, *Ent. mon. Mag.*, **98** : 260).

COMMUNICATIONS

A brief account of his attempt to pursue studies of a new syrphid in N. Wales was given by Mr. P. N. CROW. He also said he had taken a female form of *Plebejus argus* L. (Lep., Lycaenidae) somewhat like the aberration *masseyi* Tutt which used to occur in Westmorland until 1926, when a severe frost at the end of May wiped out the insect including the beautiful female form.

Mr. R. F. BRETHERTON said this form from N. Wales had in fact been described many years ago. The PRESIDENT added that Mr. H. N. Michaelis used to take this form in N. Wales and Mr. J. M. CHALMERS-HUNT, who knew the form from Great Orme Head, said it was smaller than ab. *masseyi*.

Commenting on the *Eurynebria complanata* (L.) exhibited, Mr. F. D. BUCK said it had a distribution often referred to as 'lusitanian', i.e., Portugal, the north Spanish coast, the western French coast, the Devon and Cornwall peninsula, the Gower coast and Ireland. Examples from the Iberian peninsula and the Biscay coast were usually very much paler; and though the insects become darker when dead, he had seen set specimens taken by Dr. B. P. Moore from the south-western corner of Europe which were considerably paler than any British specimens he had seen.

Referring to Dr. B. J. MacNulty's exhibits and notes at the meetings of 24th September 1970 (4 : 7) and 9th September 1971 (4 : 98), Mr. A. E. GARDNER drew attention to a note on the capture of *Aradus betulae* (L.) (Hem., Aradidae) by Mr. P. Skidmore at Knockinfin Farm, near Tomich, E. Inverness-shire, and Guisachan, also E. Inverness-shire. The note (1962, *Ent. mon Mag.*, **98** : 264) was above the name of Dr. A. M. Massee.

The President's exhibit produced the remark from Mr. S. N. A. JACOBS that he could see one living larva in the mines.

A talk on the Gelechiidae (Lep.) was given by Mr. E. S. BRADFORD and Mr. P. A. GODDARD. The talk was illustrated by coloured transparencies and followed by a discussion.

14th OCTOBER 1971

The President, Col. A. M. EMMET, in the Chair

The death was announced of Air Marshal Sir Robert Saundby.

The following new members were declared elected: P. J. Attewell, K. M. Gravener, A. Lewvonich, A. Lynn-Jones and E. H. Wilde.

EXHIBITS

Col. A. M. EMMET—An elm mining nepticulid, *Stigmella ulmivora* Fol., which he believed may prove to include both *S. ulmifolia* Hering and *S. ulmi* Skala. The mines of all three reputed species are different; *S. ulmivora* disperses its frass, filling the mine; *S. ulmifolia* leaves its frass in the centre of the mine; and *S. ulmi* leaves its frass in the form of blobs. All three have been bred and no differences can be detected in the imagines. The genitalia have not yet been examined, but in this genus the genitalia intergrade so much that a much longer series must be examined. It was pointed out that it is not unique for a single

species to have several forms of mine. There is another species which mines elm, *S. ulmicola* Hering in which the frass in the mine is packed in thick arcs, but the exhibitor has not bred this insect and is unable to pass an opinion on it.

Mr. R. W. J. UFFEN—Three species of sawfly (Tenthredinidae) larvae: *Pteronidea (Nematus) melanaspis* (Hart.) on sallow, *Hemicroa crocea* (Geoff.) on birch, both from Oxshott, Surrey; and *Macrophyia punctumalbum* (L.) on *Ligustrum vulgare* L. from Thornwood, near Epping, Essex. He also showed cases of *Coleophora salicorniae* Wocke (Lep., Coleophoridae) cut from the tips of the stems of *Salicornia* and attached to the sides of other stems for further feeding. These were taken at Fingringhoe, Essex, just outside the Essex Naturalists' Trust reserve, 9.x.71, though it is thought likely that the species does occur within the reserve. The actual species of *Salicornia* was not determined, but the larvae were found only on the Glasswort above high-water mark. The larva mines up the centre of the stem to reach the seeds, it then cuts off the tip which it uses as a case which it fixes to the side of a stem to continue feeding. A case is not used until the final instar. At the termination of the final instar the larva, still in its case, falls to the ground, when it leaves the case and pupates in the mud.

Mr. P. BOSWELL—*Lasius brunneus* (Lat.) (Hym., Formicidae), a species which in this country lives in live oak and which was taken at Old Woking, Surrey. In France the exhibitor has known the species to live in the ground, though usually associated with wood.

COMMUNICATIONS

Referring to his exhibit at the previous meeting (p. 129), Col. A. M. EMMET said he had now bred ten examples of *Phyllocoptis saligna* Zell.

Commenting on the performance of his light trap over the past two months Mr. R. F. BRETHERTON said it was the poorest in the eight years he had operated a trap at Bramley, Surrey. It was he said an unfavourable two months as far as weather conditions were concerned, but there had been nights when a good catch might have been expected, and even these were poor in comparison. He offered, as a possible explanation, the high proportion of ichneumons that figured in his catch.

Mr. F. D. BUCK who had been out with a light in the Colchester area on several occasions during these two months agreed that the nights were mainly unpropitious and the catches were very poor, but he had not noted any quantities of ichneumons.

Another member reported poor catches in Devon and a high proportion of ichneumons.

It was thought by Mr. A. E. STUBBS, that certain conditions favoured certain kinds of insects; one night the predominant Order might be Diptera, another Trichoptera, and yet another ichneumons. This did not convince Mr. Bretherton.

Mr. A. E. GARDNER said that *Lasius brunneus* (Lat.) had infested the oak timbers in a pre-war house at Esher, Surrey, to the extent that the owner eventually left. It had cost a considerable amount of money to eradicate them.

Windsor Forest was, according to Mr. Stubbs, the classical locality for *L. brunneus*. He was surprised to beat the ant out of birch on Wisley Common, Surrey, in some numbers.

The PRESIDENT made the following announcement regarding the Professor Hering Memorial Research Fund: After considering applications received by 30th September 1971, the Management Committee has made awards to: Miss J. M. Ruse, Department of Zoology, University of Manchester, to help her

research on the biology of leaf miners and their parasites on *Sorbus aucuparia* and related host plants; and to Mr. P. R. Cobb, Editor of the Proceedings of the Heacham and West Norfolk Natural History Society, for continuation of his work on the life-cycle and distribution in Britain of the gall-wasp *Andricus quercusalicis* Burgsdorff. The Committee seek further applications for consideration before 31st March 1972, in time for the collecting season.

Mrs. F. M. MURPHY gave a talk on spiders which she illustrated with coloured transparencies and which was followed by a discussion.

11th NOVEMBER 1971

The President, Col. A. M. EMMET, in the Chair

The following new members were declared elected: Miss M. L. M. Archer and Miss J. E. Marshall, and Messrs. G. Ventom, F. W. Taylor and C. D. Warren-Smith.

EXHIBITS

Col. A. M. EMMET—A species of microlepidoptera (Nepticulidae) new to Great Britain. Last year when collecting *Dechtria subbimaculella* Haw., a species which makes a unique mine in that it slits the skin of the mine through which it ejects the frass, leaving the mine comparatively clean, it was found there were two quite different kinds of mine. In some there was no slit; furthermore there was a different larva in each type of mine. In the mine without the slit the larva had a light reddish brown head, whilst in the other kind of mine the head was dark brown. The result of consulting the Hering herbarium in the British Museum (Nat. Hist.) indicates the mine without the slit to be *Dechtria quercifoliae* Toll., though there is some possibility it might be *D. heringi* Toll. The mines of these 'green island' feeders in fallen leaves are not easy to determine when the material is not fresh, but the insect is most likely to be *D. quercifoliae* Toll.

Examples of both types of mine were exhibited, from material taken at Quendon, Essex. The unslit mines have also been found at Maddingley and Wicken Fen in Cambs. and in localities in Hants. Although mines with the slit have been found in Epping Forest and at Woodford in Essex the other type has not been present.

COMMUNICATIONS

The presence of large numbers of *Aeshna mixta* Lat. (Od., Aeshnidae) at Pett Level near Hastings, Sussex, 6.x.71, was reported by Mr. C. O. HAMMOND. He pointed out the habit of the *Aeshna* species of claiming territory which they defend against intruders and said there were so many present that the dragonflies were only a few yards apart. He thought they may have been migrating into this country and added that he saw only two females ovipositing.

With reference to the 'green islands' occupied by larvae in fallen leaves, a theory was put forward that trees injected a substance into the leaves which turned the colour and dried them. The larvae feeding in these 'green islands' blocked off the veins preventing this substance entering the area where the larvae were feeding, thus creating the 'green island'. Col A. M. EMMET, however, asked how this could happen in those cases where the 'green island' was completely surrounded by withered leaf.

An alternative suggestion was made by Mr. E. H. WILD who thought the change

in colour and the drying was due to loss of moisture from the tissue cells, and the respiration of the larva in the 'green island' provided sufficient moisture to retain colour and texture.

It was, however, pointed out that the pimple gall on beech leaves was also associated with a 'green island', which complicated the matter.

A remark by Mr. C. O. Hammond that some butterflies were on the wing later this year, when he cited *Vanessa atalanta* L. (Nymphalidae) in flight, lxi.71, prompted Mr. E. H. Wild to record the same species in Dorset late in October, and Mr. B. Goater to record a substantial flight of this butterfly emigrating from Cornwall in late October.

To this Mr. J. M. Chalmers-Hunt added that he had seen *Orgyia antiqua* L. (Lymantriidae) on 23.x.71.

Commenting on the exhibit of Col. Emmet, Mr. S. N. A. JACOBS said that an interesting thing about the new mine was that after leaving the egg the larva had crossed the mid rib.

A discussion took place on the Annual Exhibition during which the President read a letter from Mr. J. Firmin, strongly criticising the heavy collecting of *Gortyna borrelii* Pierre evidenced by the Annual Exhibition. Members spoke against this kind of excessive collecting and Mr. F. D. BUCK expressed the Essex Naturalists' Trust's grave concern about both the insect and its foodplant. There was no voice raised in defence of long series collecting and the meeting could be regarded as unanimously in agreement with Mr. Firmin. In concluding the discussion the President called for the utmost restraint when working for this, or any other, very localised species.

25th NOVEMBER 1971

The President, Col. A. M. EMMET, in the Chair

The President opened the meeting by welcoming Dr. Lazlow Gozamany, from Budapest, who is at present working on Tineidae (Lep.) at the British Museum (Nat. Hist.).

The death was announced of Dr. Roger Clarke.

The following new members were declared elected: Messrs. P. R. Cobb, R. J. Dickson, G. R. Else, M. S. Marshall, R. M. Pyle and P. A. Sokoloff.

EXHIBITS

Col. A. M. EMMET—*Dechtria quinquelle* Bed. (Lep., Nepticulidae) and commented on the mystery of the spots on the larvae in this species, during which he read a letter from Mr. D. W. H. ffennell on the same subject.

Mr. C. O. HAMMOND—A male *Doros conopseus* (F.) (Dipt., Syrphidae) taken between Benfleet and Leigh-on-Sea, 9.vi.49. This insect has been taken in the same locality by G. H. Verrall, 18.vi.1871 and by Moses Harris in 1771. Subsequent captures in this locality are: A. M. Low, a female, 7.vi.52; C. O. Hammond, a female, 11.vi.60; and R. M. Payne, 13.vi.71. Single examples have been taken in the Wyre Forest, Worc.; Glanvilles Wootton, Dorset; near Lewes, Sussex; Grange-over-Sands and Witherslack, Lancs.; Aberdaron, Caern.; Cossington and Loxley Wood, Somerset; and Mickleham, Surrey. The dates of capture range from 27th May to 18th June.

Mr. S. N. A. JACOBS—Drawings of mines in oak, which Col. Emmet said were *Dechtria quercifoliae* Toll. (Lep., Nepticulidae) which had been confirmed by J. Klimesch.

Mr. S. A. WILLIAMS on behalf of Mr. D. H. MURRAY—Two species of Coleoptera from North Africa; *Pinelia grossa* F. (Tenebrionidae) from Hammamet, Tunisia, 15.v.71; and *Carabus morbillosus* F. (Carabidae) also from Hammamet, 30.iv.71. Also shown was the English carabid beetle *Cicindela campestris* L. bred from the larva taken in the New Forest, Hants., and which emerged 17.viii.71.

Mr. P. A. BOSWELL—Workers, both living and dead, and a live queen of *Formicoxenus nitidulus* (Nyl.) (Hym., Formicidae) taken in the nest of *Formica rufa* L. (Hym., Formicidae) at Wisley, Surrey, 7 & 13.xi.71. Few workers of *F. rufa* were found: it might possibly be easier to find *F. nitidulus* if it were looked for later in the year.

Mr. G. M. DE ROUGEMONT—The ant *Formicoxenus nitidulus* (Nyl.) from Wisley, Surrey, 7 and 13.xi.71.

COMMUNICATIONS

The President announced a donation of £20 had been received from Mr. and Mrs. T. G. Howarth, being the profit made from the light refreshments which they have been good enough to arrange and serve for the benefit of members at the meetings.

Mr. D. E. KIMMINS gave a talk on 'Hunting Insects with a Camera' which he illustrated with coloured transparencies, and which was followed by a discussion.

THE PROFESSOR HERING MEMORIAL RESEARCH FUND

The British Entomological and Natural History Society announces that, as a result of applications received by 30th September 1971, awards have been made to Miss J. M. Ruse, Department of Zoology, University of Manchester, to help her research into the biology of leaf miners and their parasites on *Sorbus aucuparia* and related host plants; and to

Mr. P. R. Cobb, Editor of the Proceedings of the Heacham and West Norfolk Natural History Society, for continuation of his work on the life-cycle and distribution in Britain of the gall-wasp *Andricus quercusalicis* (Burgsdorff).

Further applications are invited for awards to be made after 31st March 1972, for the promotion of entomological research with particular emphasis on:

- (a) Leaf miners
- (b) Diptera, particularly Trypetidae and Agromyzidae
- (c) Lepidoptera, particularly Micro-Lepidoptera
- (d) General Entomology

in the above order of preference, having regard to the suitability of the candidates and of the plan of work proposed.

It is envisaged that awards would be made to assist travelling and other expenses, necessary for field work, for the study of collections, for attendance at conferences, or for exceptional costs of publication of finished work. In total they are not likely to exceed about £120 in 1972.

Applicants need not be resident in the United Kingdom, and research in any part of the world may qualify.

Applicants should send a statement of their qualifications, of their plan of research, and of the precise objects for which an award is sought, to R. F. BRETHERTON, C.B., M.A., F.R.E.S., Hon. Treasurer, Folly Hill, Birtley Green, Bramley, Guildford, Surrey, early in 1972 and in any case not later than 31st March.

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MEETINGS OF THE SOCIETY

are held regularly at the Society's Rooms, but the well-known ANNUAL EXHIBITION takes place in the autumn in the Conversazione Room at the British Museum (Natural History). Frequent Field Meetings are held at weekends in the Summer. Visitors are welcome at all meetings. The current Programme Card can be had on application to the Secretary.





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